IV.5 FLOOD HAZARD, HYDROLOGY, AND DRAINAGE

IV.5.1 Approach to Impact Analysis

This chapter analyzes potential impacts to surface water resources. Chapter III.5, Flood Hazard, Hydrology and Drainage, describes existing conditions for surface water. This analysis of impacts for each alternative within the Desert Renewable Energy Conservation Plan (DRECP) Land Use Plan Amendment (LUPA) decision area examines likely activities and their impacts to surface water on Bureau of Land Management (BLM)-managed lands as well as the overall conservation strategy within the LUPA Decision Area. Transmission facilities may also be developed outside Development Focus Areas (DFAs), but would fall under the Proposed LUPA's permitting and management conditions.

Construction and operation of renewable energy projects could worsen flooding and disrupt natural stream processes, increase erosion and downstream soil transport, and degrade or contaminate soil and water. Extensive existing regulatory programs currently prevent or minimize these adverse environmental impacts. The focus of this programmatic analysis instead identifies a range of potential effects on flooding, hydrology, and drainage and applies those programs and Conservation and Management Actions (CMAs) to avoid, minimize, or mitigate adverse effects to the environment.

IV.5.1.1 Assumptions

Assumptions used in this analysis flood, hydrology and drainage impacts include the following:

- Renewable energy development within the DRECP area would neither require nor cause any new appropriations or diversions of surface waters to meet water supply needs during the construction, operation, maintenance, or decommissioning of renewable projects. Water would come primarily from existing groundwater supplies from local water purveyors. For more information on groundwater, see Chapter IV.6, Groundwater, Water Supply, and Water Quality.
- This analysis does not evaluate impacts to designated wild and scenic rivers since they are already protected under the federal Wild and Scenic River Act. Only 26.3 miles of the Amargosa River have this designation within the LUPA decision area. The BLM is currently preparing a Stream Management Plan for this section of the Amargosa River, which will further define allowable activities within its vicinity and provide clear setback requirements for possible nearby development. Included in this analysis are CMAs developed by BLM to avoid or minimize adverse environmental impacts, including the requirement that renewable energy projects would either avoid or be set back from wild and scenic river boundaries within the DRECP area.

- Potential adverse impacts to springs and seeps are similarly not evaluated because they are already protected under CMAs; because of their limited areal footprint they can also be easily identified and avoided in development areas. Springs depend largely upon groundwater; for more information on their relationship to groundwater see Chapter IV.6, Groundwater, Water Supply, and Water Quality.
- Potential violations of water quality standards or waste discharge requirements, or surface water quality degradation, are not quantifiable under the programmatic DRECP. Water quality standards compliance is federally mandated (Clean Water Act [CWA] Sections 303, 401, 402, and 404) (Resource Conservation and Recovery Act), state mandated (Porter-Cologne Water Quality Control Act, California Fish and Game Commission [CFGC] Sections 1600-1616, as amended, Sections 5650-5656), and additionally mandated by local standards and regulations. Evaluation of water quality standards compliance will be conducted on a project-specific basis and consider both project design and local conditions (see Chapter IV.6, Groundwater, Water Supply, and Water Quality). Determining surface water resource values considered their biological resource benefits, which were identified throughout development of the DRECP plan alternatives. The alternatives also identify where projects and conservation areas could be located within the LUPA decision area to avoid or minimize adverse environmental impacts to the highest-value resources, including surface water. This section quantifies potential effects to surface water for the No Action Alternative and scenarios developed through the DRECP alternatives, which by design seek to avoid or minimize adverse effects to valuable surface water resources.

Chapter IV.6, Groundwater, Water Supply, and Water Quality, further addresses water issues though its focus is groundwater.

IV.5.1.2 Methods for Quantifying Potential Effects

In this section, potential effects to each ecoregion subarea, in each alternative, are evaluated with two primary objectives in mind: to reduce flooding, to reduce water quality degradation, and reduce impacts to hydrologic surface water features; additional objectives would maintain natural surface water, groundwater, and hydrogeomorphic processes, and hydrologic regimes. Environmental impacts from full development of DFAs were quantified by measuring the following:

- **Potential to experience flood hazard.** This potential is evaluated with Federal Emergency Management Agency (FEMA) floodplain maps that show populated regions for floods with the statistical 1% chance of occurring every year (i.e., 100-year flood events). Because of its sparse population FEMA has not evaluated much of the DRECP area for potential flood hazards, so its evaluation of much of the DRECP area is inconclusive. Based on current data, flood potential hazard within each ecoregion subarea's acreage has been classified as 0.2%, 1%, minimal chance of annual occurrence, or could not be assessed. This analysis focuses on impact potential within the mapped 100-year floodplain.

- **Potential effects to surface water linear features and their contributing drainage networks.** The method used to quantify effects in the DRECP area included quantifying the lengths, in miles, of ephemeral streams and rivers, perennial and intermittent streams and rivers, and canals and ditches. When considering these potential effects it is best to also consider each feature's streambeds and channel banks and how they relate to each other and cumulatively within each ecoregion subarea. Because that data was not available, linear surface water features were quantified using only stream lengths. This method can potentially underestimate environmental effects since available data is limited to the centerline rather than the full areal extent of these features, which would include their lateral elements. In any event, a more detailed quantification of potential effects will be required in project-specific environmental assessments. Linear water resources data evaluated in this Environmental Impact Statement (EIS) come from the National Hydrography Dataset (NHD), which was developed by the U.S. Geological Survey (USGS). The NHD is a feature-based database that interconnects and uniquely identifies stream segments and reaches that make up the nation's surface water drainage system. NHD linear water resource data includes ephemeral streams and rivers, perennial and intermittent streams and rivers, and canals and ditches (USGS 2010). Additional linear water resources may exist on individual project sites. While imperfect, this method does provide relative measures to identify and assess effects to linear surface water features in the ecoregion subareas.
- **Potential effects to surface water bodies.** These effects are evaluated using acres of water in water bodies that include ephemeral lakes and playas, perennial lakes and reservoirs, wetlands (as identified in the National Wetlands Inventory [NWI] and compiled by the U.S. Fish and Wildlife Service [USFWS]), and swamps and marshes. Areal water resource data evaluated in this EIS is from NWI data developed by USFWS (USFWS 2014). This data illustrates the extent and approximate locations and types of wetlands and deepwater habitats in the conterminous United States; it also delineates the areal extent of wetlands and surface waters (Cowardin et al. 1979). Some wetland habitats do not appear in the NWI mapping program because of aerial detection limitations. The USFWS also excludes some types of "farmed wetlands" that are either defined by the Food Security Act or that do not conform to the accepted definition (Cowardin et al. 1979).

Flooding could cause erosion; the erosion potential of both wind and water is evaluated in Chapter IV.4, Geology and Soils. Chapter IV.6, Groundwater, Water Supply, and Water Quality, also addresses water issues though it focuses on groundwater.

IV.5.2 Typical Impacts Common to All Action Alternatives

The following discussion of typical impacts common to all action alternatives refers to the renewable energy and ancillary facilities described in Volume II, Chapter II.3. It describes activities during pre-construction site characterization, construction, operations and maintenance, and decommissioning.

IV.5.2.1 Impacts of Renewable Energy and Transmission Development

Flooding, conditions that could worse flooding, and impacts to other hydrologic surface water features and drainage patterns generally depend upon how widespread the land disturbance may be from renewable energy and transmission projects. The broader and more intensive the land disturbance, the greater the likelihood it could affect surface water. (See Figure III.5-1, Linear and Areal Surface Water Resources and Watersheds in the DRECP area.) Distinctions in these levels of disturbance and their potential impacts on the types of renewable energy and transmission development are discussed here.

In general, transmission development may have the least impact because its footprint—switchyard, substation, and tower and pole locations—are usually more site-selective because they require less area and can therefore avoid most surface water features. Footings for transmission and gen-ties, towers, or poles do not significantly alter existing ground conditions for drainage. New access roads would cause more widespread ground disturbance, but likely not over surface water features.

Wind energy is most like transmission because the turbine pads are small and their locations would avoid many surface water resources. Wind turbines located within a floodplain would cause minimal adverse effects if turbine pads are small and spacing allows flood flows to pass by largely unimpeded.

Geothermal development also generally causes less ground disturbance when compared with other types of projects because its power plant, switchyard, and associated steam wells and pipelines require much less area. Similar to transmission, geothermal development can be site-selective and avoid sites near surface water resources.

Solar energy development including thermal trough, thermal power tower, and photovoltaic (PV), creates the greatest land disturbance because it requires significantly more area (typically one or more square miles compared with fewer than 100 acres for most geothermal). The extent of ground disturbance varies; required thermal trough and

PV site grading removes all vegetation, disturbs biological soil crust, and causes the greatest disturbance to surface water and drainage patterns. Disturbance to vegetation and surface soils changes infiltration and runoff, which in turn leads to greater potential for erosion, sedimentation, flooding, and water quality degradation. Thermal power tower has fewer land disturbing impacts when compared with thermal trough and PV by largely maintaining existing ground contours within the mirror field and cutting vegetation near ground level instead of entirely removing it (thereby maintaining existing surface soil characteristics). However, many varieties of vegetation will not survive or remain as vigorous as they were before the ground disturbance; and although surface soils are not removed by grading, their infiltration and runoff characteristics can be significantly altered. While not all solar technologies and projects will require the same acreage per megawatt (MW) of installed capacity, DRECP assumes 7 acres per MW for all solar technologies.

IV.5.2.1.1 Impacts of Site Characterization

Site characterization activities that could affect surface water include off-road travel and geologic borings. Soil and vegetation disturbance from off-road travel can compact soil, disturb biological soil crusts, and damage vegetation, consequently changing water infiltration and runoff characteristics. Greater runoff could in turn change natural ground conditions and cause erosion. Off-road travel can also cross ephemeral streams, which could in turn impact the stream's bed and bank structure and alter its course or change its flow rates and frequencies. These stream impacts could then affect morphological and ecological processes to both vegetation and animal species. Drilling geologic borings can cause similar impacts from travel to and from boring sites; equipment could also cause soil and water contamination if hydraulic drilling equipment leaks, or if drilling fluids are not properly contained and treated.

IV.5.2.1.2 Impacts of Construction and Decommissioning

IV.5.2.1.2.1 Flood Hazards and Effects on Streams and Rivers

Land disturbance activities described in Covered Activities in Volume II, including clearing, grading, excavating, road construction, vegetation removal, fencing, drainage, and building flood control structures could all potentially disrupt drainage patterns, particularly to ephemeral stream channels. Considering the large areas required for most renewable energy projects, it is likely that ephemeral and intermittent streams will flow through proposed project areas and that their drainage paths and patterns will be altered. Project facilities, roads, temporary laydown areas, and their surrounding environments can all be subject to flooding during project construction and decommissioning. Flooding may cause environmental damage beyond facility sites and include erosion, sedimentation, and soil and water contamination from hazardous materials transport. Stream disturbance can also alter and diminish riparian habitat and the wildlife that depends upon it, as described in Chapter IV.7, Biological Resources.

Disturbance to episodic streams could disrupt numerous ecological functions including (1) watershed and landscape hydrologic connections; (2) water supply protection and water-quality filtering; (3) wildlife habitat movement and migration corridors; (4) sediment transport, storage, and deposition; (5) groundwater recharge and discharge; (6) vegetation community support; and (7) nutrient cycling and movement. These streams also form critical interactions with adjacent drier upland areas to support critical species life stages and contribute to overall regional biodiversity. These systems provide primary habitat, predator protection, movement corridors, migration stop-over sites, breeding and nesting sites, shade, and food sources and water in temporary or permanent pools for many species (Southern California Coastal Water Research Project [SCCWRP] 2011).

Ground disturbances within drainage areas can cause one or more of the following long-term effects:

- Alter existing drainage patterns through grading or channelization that could cause concentrated stormwater flow patterns that could in turn increase erosion, sediment transport, and flooding when compared with natural diffused or distributary stormwater flow patterns.
- Substantially increase the rate or amount of surface runoff through ground disturbances (e.g., paving) that make the ground less pervious, which could then cause flooding, substantial erosion, and sediment transport, both on and off site.
- Alter the course of a stream or river or change its flow rates and frequencies, causing changes to morphological and ecological processes that affect vegetation and animal species as subsurface water availability changes.
- Diminish the surface crusts found on relatively undisturbed soil surface areas of playas, increasing their vulnerability to wind erosion.
- Create or contribute to runoff that would either exceed the capacity of drainage systems or increase sources of polluted runoff.
- Place structures within a flood hazard area that would impede or redirect flood flows, causing debris scatter or conveyance of hazardous materials or wastes.

IV.5.2.1.2.2 Effects on Springs

Springs sustain habitat and wildlife; considering the lack of continuously flowing surface water in the DRECP area, springs provide important environmental value, though it’s typically limited to their immediate locations. Disturbing springs would cause long-term adverse impacts to discharge, distribution, and the other ecological values springs provide.

If a spring is disturbed or enclosed within the fenced area of a renewable energy or transmission facility, wildlife would not be able to reach it.

IV.5.2.1.2.3 Effects on the Water Quality and Beneficial Uses of DRECP Area Waters

Construction and decommissioning project phases would most likely affect the water quality and beneficial uses of DRECP area waters. During construction, hazardous materials, particularly oil-based and liquid chemical products, can spill and cause contamination to soils, surface water bodies, and groundwater. Groundwater encountered during excavation can become turbid and degrade surface water quality if not properly managed. Water used for hydrostatic testing and flushing pipelines can contain metals and other hazardous substances, so can affect surface and groundwater quality if not properly treated before discharge. Storage of hazardous materials and wastes during construction and decommissioning can be disturbed by stormwater and flooding if not properly contained, or if project-related stormwater drainage facilities are not properly designed. These project-related activities can cause degradation and long-term adverse effects to water quality.

Beneficial water uses within the DRECP area include:

- Rare, Threatened or Endangered Species – Beneficial waters that support habitat necessary for the survival and successful maintenance of plant and animal species designated under federal or state law as rare, threatened or endangered.
- Warm Freshwater Habitat – Beneficial water uses that support warm water ecosystems including, but not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife, including invertebrates.

Strategies including avoidance, minimization, and mitigation measures could all be used when evaluating specific projects to avoid or minimize potential adverse impacts to the beneficial uses of water. Unavoidable impacts requiring mitigation are as listed in the Conservation and Management Actions section of this chapter. Water Quality is also evaluated in Chapter IV.6 Groundwater, Water Supply and Water Quality.

IV.5.2.1.3 Impacts of Operations and Maintenance

Project facilities, roads, and their surrounding environments can be flooded during operations and maintenance. Considering the large area of most renewable energy projects, it is likely that ephemeral streams will flow through proposed project areas, and that drainage paths and processes will be altered. This can cause developed drainage systems to exceed their design capacities, which in turn could damage both the project and the environment, both on and off site (e.g., erosion, sedimentation, and contamination of soil and water by transport of project-related hazardous materials and wastes). Disturbance to streams can also alter and diminish riparian habitat (see Chapter IV.07, Biological Resources). If a spring is enclosed within a project's fenced area, wildlife would not be able to reach it.

Hazardous material and waste storage during operations and maintenance can be disturbed by stormwater and flooding if not properly contained, or if stormwater drainage facilities are not properly designed. Heat transfer fluids from some solar thermal-electric generation technologies (e.g., parabolic trough) can also potentially contaminate soils, surface water, and groundwater if there is a rupture in heat transfer piping systems. These project-related activities can cause degradation and long-term adverse effects to water quality and the beneficial uses of surface waters and groundwater.

IV.5.2.2 Impacts of the Ecological and Cultural Conservation and Recreation Designations

In order to meet purpose and need for the Proposed LUPA (defined in Volume I), ecological and cultural conservation designations were developed for each alternative. Conservation designations include existing conservation (Legislatively and Legally Protected Areas [LLPAs]) and LUPA Conservation Designations. Setting aside lands where disturbance would be minimized is a beneficial effect for surface water resources because of the reduced ground disturbance and resulting runoff in the vicinity of linear and areal surface water resources. Exacerbation of flood effects and degradation of water quality would not occur because there would not be any alteration to the drainage area and natural hydrologic processes within the 100-year floodplain. To the extent projects could be avoided within drainage areas, it would minimize the potential for contamination to soil and water from project-related hazardous materials and wastes.

For surface water resources, CMAs and conservation designation are different for each alternative but also have similarities. For each alternative, there are the following differences: (1) the areal density of surface water features (including wetlands, the bed and banks of streams, and lakebeds of reservoirs and playas versus the overall area of land); (2) the location and areal extent of lands selected for DFAs versus location of surface water resources; and (3) the location and areal extent of conservation lands versus locations of surface water resources. These distinctions are considered in more detail in Section IV.5.3, Impact Analysis by Alternative.

Because LUPA land designations would be managed to protect ecological, historic, cultural, scenic scientific, and recreation resources and values, they would also confer general protection for surface water resources**.** While other land uses are allowed within these areas, other uses must be compatible with the resources and values that the land designation is intended to protect.

Setting aside lands for no disturbance is a beneficial effect for surface water resources because road crossings and ground disturbance would be avoided in the vicinity of linear and areal surface water resources. Exacerbation of flood effects and degradation of water quality would not occur because there would not be any alteration to the drainage area and natural hydrologic processes within the 100-year floodplain. To the extent developments are avoided within drainage areas, they would also minimize the potential for soil and water contamination from project-related hazardous materials and wastes.

Details on allowable uses and management within National Conservation Lands appear in the Proposed LUPA description in Volume II. Details on the goals, objectives, allowable uses, and management actions for each Area of Critical Environmental Concern (ACEC) and Special Recreation Management Area (SRMA) are in the LUPA worksheets in Appendix H.

IV.5.3 Impact Analysis by Alternative

The following sections present impact analyses for the No Action Alternative, the Preferred Alternative, and Alternatives 1 through 4. The process for determining which surface water resources have the highest values primarily considers their biological resource benefits, which were identified through the process of developing alternatives. The alternatives determine where development and additional conservation areas would be located to avoid or minimize effects to the highest value resources, including surface water. This section focuses on quantifying potential effects to surface water resources for the No Action Alternative and the scenarios developed through the defined alternatives, which by design seek to avoid and minimize effects to valuable surface water resources.

IV.5.3.1 No Action Alternative

In the No Action Alternative, no DFAs would be created. Instead, the existing geographic distribution of existing renewable energy development is assumed to continue. Conservation lands would remain as currently designated.

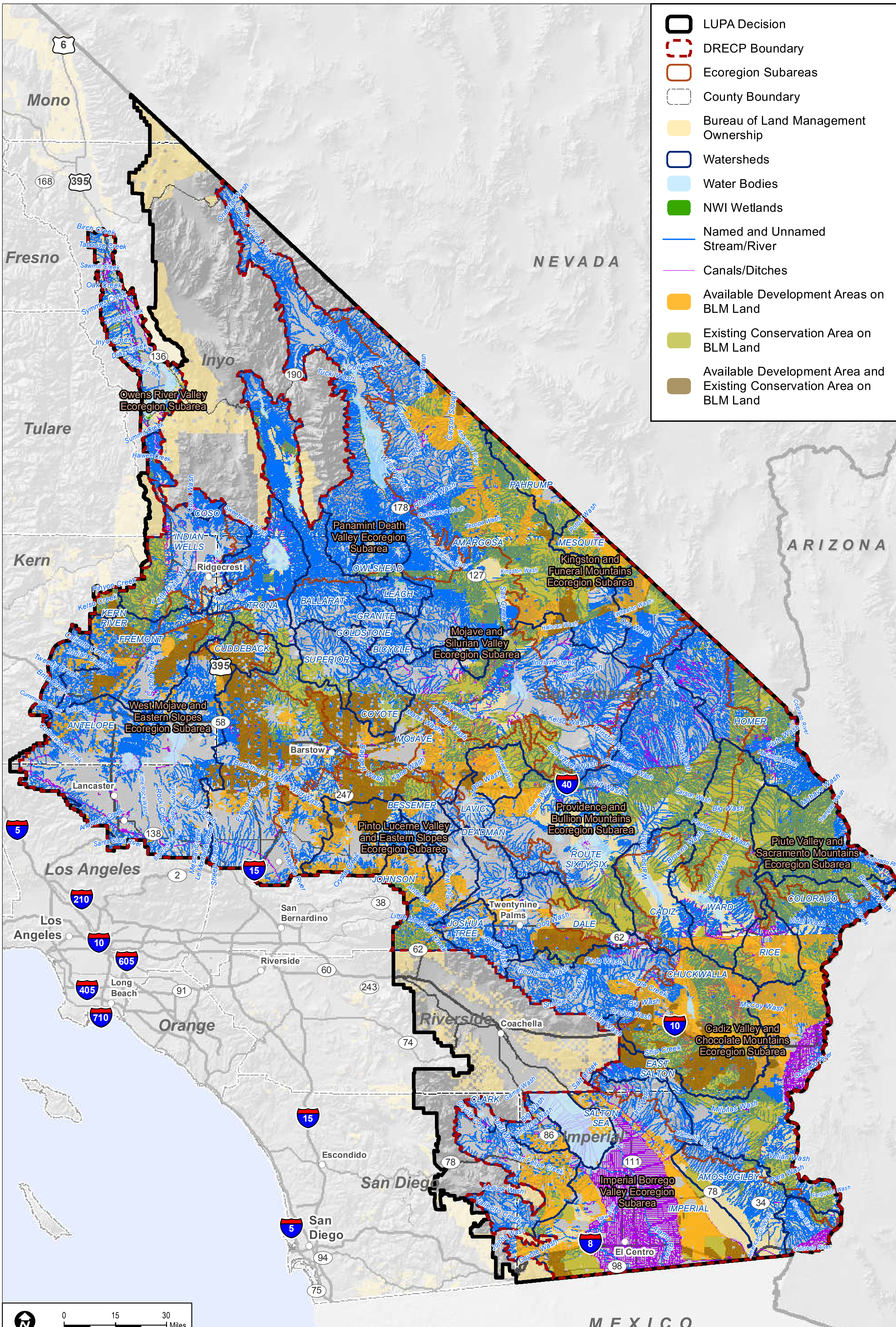
Figure IV.5-1 shows the expected geographic distribution of renewable energy development in the DRECP area and where conservation areas exist in relation to surface water resources for the No Action Alternative. Major surface water resources that could be developed under the No Action Alternative include the Amargosa, Mojave, and Colorado rivers.

Climate Change and Surface Water Effects. Climate change in the DRECP area was evaluated by the Conservation Biology Institute (CBI) and is presented in the report Climate Change (Bachelet 2013) and in Appendix P. The CBI report provides background information for climate change and describes long-term adaptive management strategies. The CBI report provides information regarding:

- The existing climate setting for the Mojave and Sonoran deserts.
- The development of climate models, including uncertainty and scale issues.
- Projections for climate change in the DRECP area, including temperature and precipitation patterns and their effects on snowpack, hydrology, vegetation, and fuels and fire risk.

The CBI report summarizes several of the projected large-scale environmental effects of climate change that will likely affect natural resources in the DRECP area, including changes in snowpack, hydrology, vegetation, and fuels and fire. Snowpack is projected to decrease under both the drier and wetter scenarios of the Parallel Climate Model (PCM) and Geophysical Fluid Dynamics Laboratory (GFDL) scenarios, although the PCM projects slightly higher snowpacks at higher elevations of the Sierra Nevada through the twenty-first century (see Figure 14 in Appendix P).

Snowpack levels and the timing of precipitation and groundwater levels will all alter major river flows, with a modest decrease in Colorado River flows and alterations in the hydrology of the Amargosa and Mojave rivers (although the CBI report does not elaborate on the specific types of those alterations). The Mojave River receives runoff from the San Bernardino Mountains, and the Amargosa River is bordered by several high mountain ranges that accumulate winter snowpack (see Figure 14 in Appendix P). Under both the PCM and GFDL models there will be substantial reductions in snowpack in both the San Bernardino and San Gabriel mountain ranges by 2100, as well as in the mountain ranges bordering the Amargosa River.



Sources: ESRI (2014); CEC (2013); BLM (2015); CDFW (2013); USFWS (2013); USGS (2011); RECON (2015)

FIGURE IV.5-1

Linear and Areal Surface Water Resources and Watersheds in the DRECP Plan Area - No Action Alternative

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The Amargosa River region is sparsely populated and land uses along the river include rural communities, mining, and agriculture. The Amargosa River currently has surface flows, which extend about 17 miles along the river in the Shoshone, Tecopa, and Amargosa Valley areas and support well-developed cottonwood-willow riparian habitat that provides valuable wildlife habitat for a variety of species.

The Mojave River runs approximately 100 miles from the northern slope of the San Bernardino Mountains at Summit Valley near Cajon Pass, north through Victorville, to the northeast through Barstow, and then east through the Mojave Valley and Camp Cady to a closed basin sink near Baker. The Mojave River surface water flows are mostly ephemeral and occur during the winter and spring as a result of storm runoff. Recharge of the water basin along the Mojave River is primarily (up to 80%) from stormflow infiltration from the mountains in January through March, but the water table is being overdrafted by urban use, which is affecting the hydrology of the system and riparian communities along the river. With a reduction in the snowpack and increased human demands, it is expected that the Mojave River will be stressed by future climate change.

Hydrologic effects under drier climate conditions also include reduced soil moisture and less groundwater recharge. Both the PCM and GFDL models project climate water deficits, which is the difference between actual evapotranspiration (AET) and potential evapotranspiration (PET), or PET-AET, or where evaporative demand is greater than available water (see Figure 6 in Appendix P). The CBI report suggests that, with these changes, riparian corridors will become "islands of refuge" for species at risk from extreme heat and evaporative demand.

IV.5.3.1.1 Impacts of Renewable Energy and Transmission Development

For the No Action Alternative, the locations for development may not avoid disturbance to the most sensitive surface water resources with the highest values for hydrologic function including maintaining natural surface water processes, groundwater processes, hydrogeomorphic processes, and hydrologic regimes. The impacts that have been defined are the types identified by, and based on the experience of, the lead agencies for approved solar, wind, and geothermal renewable energy and transmission projects.

The No Action Alternative would allow renewable energy and transmission development anywhere within existing unrestricted lands in the DRECP area. The following impacts from ground disturbance and development within drainage areas can cause one or more of the following long-term effects common to the No Action Alternative and all other alternatives.

Impact FH-1: Activities could substantially alter existing drainage patterns and increase the risk of flooding on or off site.

The extent to which drainage patterns can be altered and the risk of flooding on or off site increased is a combination of one or more of the following effects from development within a floodplain. Those effects could:

- Alter the existing drainage pattern of the site or area through grading or channelization, resulting in concentrated stormwater flow patterns that increase the potential for erosion, sediment transport, and flooding compared with natural diffused or distributary stormwater flow patterns.
- Substantially increase the rate or amount of surface runoff by ground disturbance and treatments that make the ground less pervious (e.g., paving) in a manner that could cause flooding or substantial erosion and sediment transport on or off site.
- Diminish the physical and biological crusts on relatively undisturbed soil surface areas of playas, increasing their vulnerability to erosion.
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or contribute to substantial additional sources of polluted runoff.

Any ground disturbance in the vicinity of a surface water feature, particularly those associated with construction and decommissioning, can lead to long-term adverse impacts to surface water resources. Significant land disturbance can occur during the construction and removal of facilities. As discussed in Section IV.5.2, Typical Impacts Common to All Action Alternatives, development with the greatest to the least typical land disturbance is: solar, geothermal, wind energy, and transmission.

As summarized in Table IV.5-1 (see Appendix R2, Table R2.5-1 for complete data), development within the No Action Alternative could occupy about 1,344 acres of lands within the mapped 100-year floodplain on BLM lands in the DRECP area. This represents about 1% of the total mapped 100-year floodplain area on BLM lands in the DRECP area. Solar energy represents about 80% of this small percentage of potential development, mostly in the Cadiz Valley and Chocolate Mountains and Imperial Borrego Valley ecoregion subareas. This would suggest that development within the 100-year floodplain on BLM lands in the DRECP area would not impact 99% of the 100-year floodplain. However, it is important to recognize that overall, 72% of the DRECP area has not been assessed for flood potential, suggesting that development within the DRECP area's 100-year floodplain could occupy more than 1% of the total area.

The No Action Alternative would not have protections under CMAs that apply to the action alternatives, so therefore does not require that areas not previously assessed by FEMA undergo hydrologic study to determine the 100-year floodplain in proximity to the project.

Table IV.5-1
Potential Development Within Mapped 100 Year Floodplains on BLM Lands in the DRECP Area (acres) – No Action Alternative

	Wind	Geothermal	Transmission	Solar	Total
Potential Development Within 100-year Floodplains on BLM Lands in the DRECP area	74	22	121	1,126	1,344
Total 100-year Floodplains on BLM Lands in the DRECP area	132,595	132,595	132,595	132,595	132,595
Percent of 100-year Floodplains that Could be Developed on BLM Lands in the DRECP area	0.1%	0%	0.1%	0.8%	1.0%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

Impact FH-2: Activities could alter hydrologic processes and water-dependent resources of surface water features.

Land disturbance activities during project development, including clearing, grading, excavation, road construction, vegetation removal, fencing, drainage and flood control structures, have the potential to disrupt drainage patterns, particularly of ephemeral stream channels. Considering the large area of most renewable energy developments, it is likely that ephemeral and intermittent streams will flow through proposed project areas, and that their drainage paths and patterns will be altered. Land disturbance can also alter the course of a stream or river, or change its flow rates and frequencies, causing variations to morphological and ecological processes that affect vegetation and animal species.

While Table R2.5-2 and Table R2.5-3 (in Appendix R2) suggest that the potential development impacts to linear and areal surface water resources on BLM lands in the DRECP area would be minimal on an overall basis (representing potential impacts to 0.8% of linear and 0.2% of areal surface water resources), it is important to recognize data limitations. Impacts to linear surface water features can potentially be underestimated since the available data is limited to consideration of only centerline lengths rather than the areal extent of these features, as defined by their streambeds and channel banks.

Impact FH-3: Activities could result in accidental releases of contaminants resulting in degradation of water quality.

During all project phases, hazardous materials used and hazardous wastes generated, particularly oil-based and liquid chemical products, if not properly handled and contained, can spill and cause contamination to soils, surface water bodies, and groundwater. Stored hazardous materials and wastes can be disturbed via stormwater and flooding if not properly established within containment areas, and can cause degradation and long-term adverse effects to both water quality and the beneficial uses of surface waters and groundwater.

Although there are no quantifiable metrics for Impact FH-3, there are distinctions in the levels of potential exposure for contaminants to enter surface waters by technology. Thermal trough technology, for example, which uses a heat transfer fluid conveyed throughout the solar field, likely has the highest exposure for spills and contamination. Although this technology uses a variety of safeguards to monitor and detect a release and limit a release should a line rupture, it is not fail safe. Thermal power tower and geothermal energy would normally limit exposure to storage of hazardous materials and wastes around the power block, which has containment systems. PV solar, wind energy, and transmission have the least exposure because there is no need for large quantities of hazardous materials to be used and stored on site (other than oil-filled electric switchgear and transformers common to all renewable energy and transmission projects). The handling, transportation, storage, and disposal of hazardous materials and wastes are regulated by a wide range of laws and regulations that would avoid or limit exposure to accidental spills and releases.

Laws and Regulations

Existing laws and regulations would reduce the impacts of renewable energy development projects in the absence of the DRECP. Relevant regulations are presented in the Regulatory Setting in Volume III. Note that because this EIS addresses amendments to BLM's Proposed LUPA, these plans are addressed separately and are not included in this section. The requirements of relevant regulations would reduce impacts through the following mechanisms:

- The Clean Water Act (CWA) establishes water quality standards, discharge prohibitions, and waste discharge limits that would help prevent degradation of surface and groundwater quality from discharges to surface waters and wetlands, point source discharges (including stormwater), and dredge and fill activities in surface waters and wetlands.
- The Resource Conservation and Recovery Act (RCRA) would help protect surface water resources from contamination by regulating the generation, transportation,

treatment, storage, and disposal of hazardous waste. RCRA is administered in California by the Department of Toxic Substances Control and California's Regional Water Quality Control Boards (RWQCBs).

- Federal Executive Order 11990 – Protection of Wetlands (applicable to federal lands) and State Executive Order W-59-93 would require projects to avoid or minimize impacts to wetlands.
- Executive Order 11988 – Floodplain Management would require developments on federal land to avoid or minimize effects within the mapped 100-year floodplain.
- The Porter–Cologne Water Quality Control Act would protect the water quality and beneficial uses of waters of the state (both surface and groundwater) under the authority of the State Water Resources Control Board (SWRCB or State Water Board) and nine RWQCBs to establish water quality standards and discharge prohibitions, issue waste discharge requirements, and implement provisions of the federal CWA.
- California Fish and Game Code, Sections 1600-1616, as amended, would help avoid or minimize effects to surface water resources from projects that could substantially divert or obstruct natural flows or change or use any material from the bed, channel, or bank of any river, stream, or lake; or deposit or dispose of debris where it may pass into any river, stream, or lake, or use materials from a streambed.
- California Fish and Game Code, Sections 5650-5656, as amended, prohibits the deposit of any substance or material deleterious to fish, plant life, mammals, or birds. County General Plans and Development Codes present standards for grading and erosion control, managing stormwater, disposing of liquid waste and extracting groundwater. If a proposed site is on federal land where county regulations are not directly applicable to the project, the federal land manager has the option to confer with the county to determine and implement specific county General Plans and Development Codes as appropriate.

Design Features of the Solar PEIS

The Solar Programmatic EIS (PEIS) includes numerous Design Features (Appendix W) that would reduce the impacts of solar energy development, including measures to minimize erosion and runoff. Following is a summary of relevant measures.

- **WR1-1.** The project developer shall control project site drainage, erosion, and sedimentation related to stormwater runoff. The project developer shall identify site surface water runoff patterns and develop measures that prevent adverse impacts associated with project-related soil deposition and erosion throughout and downslope of the project site and project-related construction areas. This shall be implemented within a Stormwater Pollution Prevention Plan and incorporated into the POD, as appropriate. Numerous specifics are presented to ensure that effects are minimized, focusing on (a) Assessing stormwater runoff concerns, and (b) Methods to minimize stormwater runoff concerns.

- **WR1-2.** Project developers shall conduct a hydrologic study (or studies) that demonstrate a clear understanding of the local surface water and groundwater hydrology. Specifics require assessment of surface water and groundwater hydrology.
- **WR1-3.** Project developers shall coordinate with BLM and other Federal, state, and local agencies early in the planning process in order to identify water use for the solar energy project, and to secure a reliable and legally available water supply to meet project water needs. Specific requirements include (a) Assessing water use, and (b) Methods for minimizing water use.
- **WR1-4.** Project developers shall avoid and/or minimize impacts on existing surface water features, including streams, lakes, wetlands, floodplains, intermittent or ephemeral streams, and playas (any unavoidable impacts would be minimized or mitigated) and in nearby regions resulting from the development.
- **WR2-1.** Project developers shall avoid, minimize, and mitigate impacts on groundwater and surface water resources in accordance with laws and policies. Specific methods are defined to minimize impacts on surface water and groundwater resources.
- **WR3-1.** Compliance with the terms and conditions for water resource mitigation shall be monitored by the project developer. The developer shall consult with BLM through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by BLM. Specifics require how the developer shall maintain the water resource design elements during operations and maintenance of the project.
- **WR4-1.** Reclamation of the project site shall begin immediately after decommissioning to reduce the likelihood of water resource impacts from project activities. Developers shall coordinate with BLM in advance of interim/final reclamation to have BLM or other designated resource specialists on site during reclamation to work on implementing water resource requirements and BMPs. Specific methods are presented for minimizing water resource impacts associated with reclamation and decommissioning activities.

Typical Mitigation Measures

The No Project Alternative would not include CMAs that are applicable to the action alternatives. Mitigation measures typically implemented to protect surface water resources include those listed here.

- **Drainage Erosion and Sedimentation Control Plan.** Lead agency stipulations typically require developers to address appropriate methods and actions, both temporary and permanent, for the protection of water quality and soil resources, and to demonstrate both no increase in off-site flooding and all monitoring and maintenance activities. Areas of clearing and grading will be defined. Treatments for exposed soils will also be defined, including dust palliatives. BMPs typically include measures designed to prevent wind and water erosion, including application of chemical dust palliatives after rough grading to limit water use. BMPs also include measures to control dust and stabilize construction access roads and entrances.
- **Waste Discharge Requirements.** These requirements relate to both discharges or potential discharges of waste that could affect the quality of waters of the United States or the state, and are typically developed in consultation with staff of the SWRCB and applicable California Regional Water Quality Control Boards (Water Boards).
- **Stormwater Diversion.** For projects that include stormwater diversion channels for routing stormwater through or around a proposed renewable energy development, measures are generally implemented to ensure that channels are maintained throughout the life of the project. Requirements may define sediment removal activities, vegetation management, bank protection and grade control, routine maintenance, and procedures for protection of downstream properties.

IV.5.3.1.2 Impacts of Ecological and Cultural Conservation and Recreation Designations

The No Action Alternative has no new conservation designations, but without approval of an action alternative, there would be continued protection of existing LLPAs like wilderness areas. In addition, under the No Action Alternative, renewable energy projects would continue to be evaluated and approved with project-specific mitigation requirements.

As summarized in Table IV.5-2 for the No Action Alternative (see Appendix R2, Table R2.5-4 for complete data), conservation of existing 100-year floodplains on BLM lands in the DRECP area associated with ACECs could account for 23,845 acres, representing about 18% of the total mapped 100-year floodplain acreage on BLM lands in the DRECP area.

Table IV.5-2
Potential Conservation of Mapped 100-Year Floodplain on BLM Lands in the DRECP Area (acres) – No Action Alternative

	Existing ACEC	Total
Potential Conservation of 100-year Floodplains on BLM Lands in the DRECP area	23,845	23,845
Total 100-year Floodplains on BLM Lands in the DRECP area	132,595	132,595
Percent of 100-year Floodplains that Could be Conserved on BLM Lands	18.0%	18.0%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

As indicated in Table R2.5-5 and Table R2.5-6 (Appendix R2) for the No Action Alternative, conservation of linear and areal surface water resources on BLM lands in the DRECP area could amount to 17% of the 80,000 miles of linear features and 10% of the 182,000 acres of areal surface water resources.

IV.5.3.1.3 Impacts of Transmission Outside the DRECP Area

Outside the DRECP area, additional transmission lines would be needed to deliver renewable energy generation to load centers (areas of high demand). It is assumed that new transmission lines outside the DRECP area would use existing transmission corridors between the DRECP area and existing substations in the more populated coastal areas of the state. The areas outside the DRECP through which new transmission lines might be constructed are San Diego, Los Angeles, North Palm Springs–Riverside, and Central Valley. These areas are described in Chapter III.5, Section III.5.10, Flood Hazard, Hydrology, and Drainage Areas.

Impact FH-1: Activities could substantially alter existing drainage patterns and increase the risk of flooding on or off site.

Transmission lines may not substantially alter drainage or increase the risk of flooding since transmission towers have small footprints and their footings introduce minimal impervious surface. Transmission tower footings will be located outside surface water features or follow appropriate laws and regulatory processes (Fish and Game Code, Sections 1600-1616, as amended) to avoid and minimize impacts to drainage patterns. Access roads would consist of either existing paved or unpaved roads and would not appreciably alter drainages. Runoff at disturbed sites would be controlled through implementation of erosion control plans and site restoration, as required by the RWQCB with jurisdiction. Runoff would not be diverted to avoid flooding on adjacent property.

Impact FH-2: Activities could alter hydrologic processes and water-dependent resources of surface water features.

Because of their small footprints and wide spacing, transmission towers are not expected to alter hydrologic process or affect surface water features. Tower footings introduce little to no barriers to flow, and the area around towers is typically restored to pre-construction conditions. Towers are generally not sited in watercourses. If it is necessary to site towers in wide playas, they are protected from erosion and minimally affect flows. Access roads may locally divert overland flows during storm events to prevent erosion, but this would be a localized event and would not disrupt or alter overall hydrologic processes.

Impact FH-3: Activities could result in accidental releases of contaminants resulting in degradation of water quality.

The primary potential contaminant used during transmission line construction would be fuel. Typically, fuel trucks deliver fuel to work sites and refuel equipment directly; fuel is not stored on site. Accidental spills can occur, but fuel vendors are required to have appropriate spill containment available so spills would be cleaned up immediately. Refueling is also typically required to be at least 50 feet from the nearest watercourse.

IV.5.3.2 Preferred Alternative

For the Preferred Alternative, geographically dispersed DFAs would be created, providing siting flexibility for renewable energy development. Additional conservation designations would be implemented through the LUPA.

Figure IV.5-2 shows the geographic distribution of renewable energy facilities within DFAs, relative to surface water resources for the Preferred Alternative. Major surface water resources that could experience development under the Preferred Alternative include the Mojave and Colorado rivers.

IV.5.3.2.1 Impacts of Renewable Energy and Transmission Development

The types of impacts that would occur for the Preferred Alternative would be similar to impacts for the No Action Alternative. Please see Section IV.5.2.1 for a more detailed description of impacts common to all alternatives. The following assessment is limited to alternative-specific measures.

Impact FH-1: Activities could substantially alter existing drainage patterns and increase the risk of flooding on or off site.

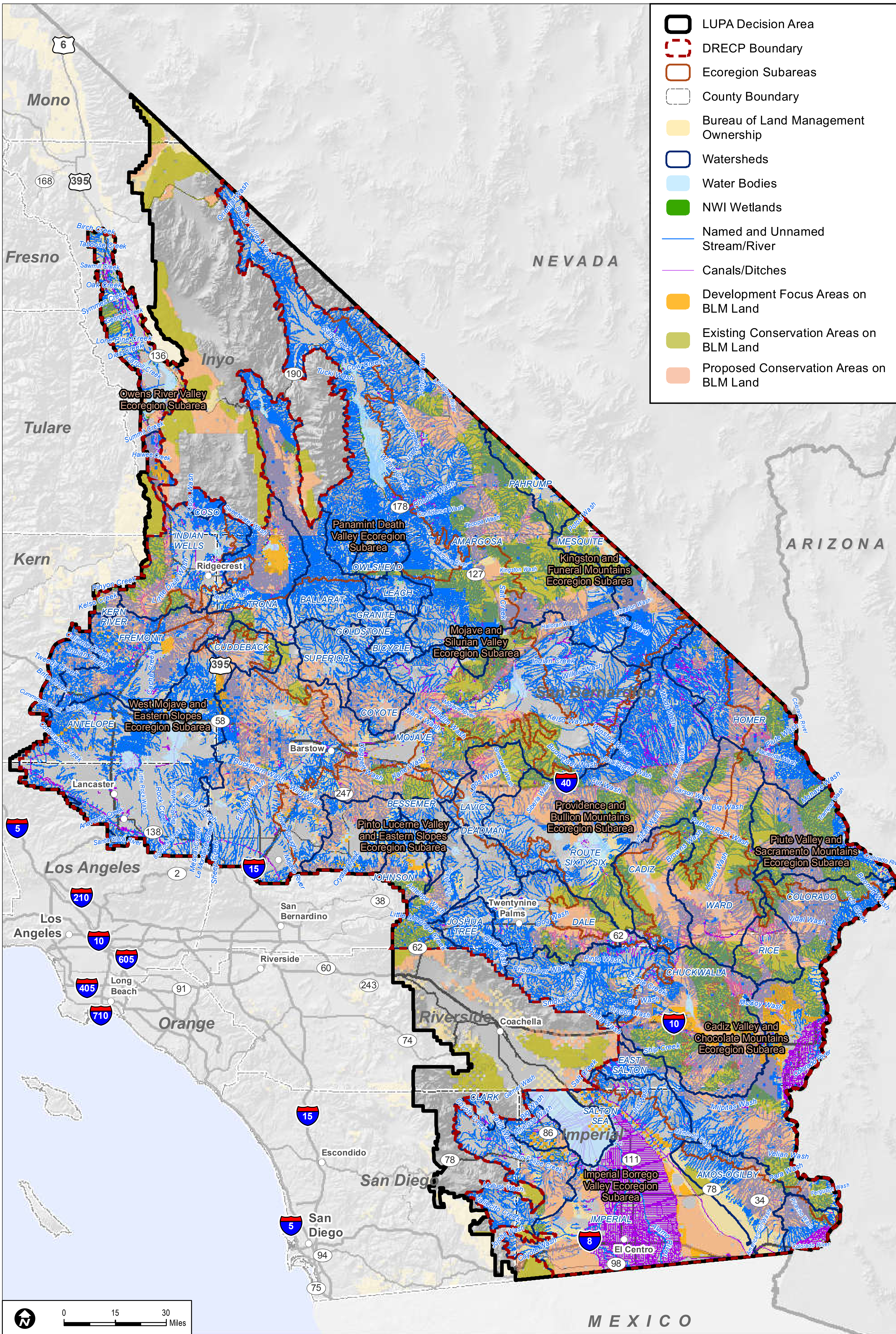
The following measure of potential activity within the 100-year floodplain indicates that potential adverse impacts from development can substantially alter drainage patterns and increase the risk of flooding.

As summarized in Table IV.5-3 for the Preferred Alternative (see Appendix R2, Table R2.5-7 for complete data), development within the 100-year floodplain on BLM lands in the DRECP area could occupy about 3,420 acres. This represents about 1.7% of the total mapped 100-year floodplain area of the DRECP area . Solar energy represents about two thirds of this small percentage of potential development, mostly in the Cadiz Valley and Chocolate Mountains, and West Mojave and Eastern Slopes ecoregion subareas. This would suggest that development within the 100-year floodplain on BLM lands in the DRECP area would avoid impacting over 98% of the 100-year floodplain. However, it is important to recognize that, overall, 72% of the DRECP area has not yet been assessed for flood potential; so development on BLM lands within the 100-year floodplain could occupy more than 1.7% of BLM lands in the DRECP area. CMAs would require areas that have not been previously assessed by FEMA to undergo hydrologic study to determine the 100-year floodplain in proximity to the project, and to avoid development within the floodplain if possible.

Table IV.5-3
Potential Development Within Mapped 100-Year Floodplains on BLM Lands in the DRECP Area (acres) – Preferred Alternative

	Solar	Wind	Geothermal	Transmission	Total
Potential Development Within 100-year Floodplains that Could be Developed on BLM Lands in the DRECP area	2,397	88	669	266	3,420
Total 100-year Floodplains on BLM Lands in the DRECP area	194,717	194,717	194,717	194,717	194,717
Percent of 100-year Floodplains that Could be Developed on BLM Lands in the DRECP area	1.2%	0%	0.3%	0.1%	1.7%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.



Sources: ESRI (2014); CEC (2013); BLM (2015); CDFW (2013); USFWS (2013); USGS (2011); RECON (2015)

FIGURE IV.5-2

Linear and Areal Surface Water Resources and Watersheds in the DRECP Plan Area - Preferred Alternative

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Impact FH-2: Activities could alter hydrologic processes and water-dependent resources of surface water features.

The following measures of potential activity within surface water features show that there could be potential adverse effects from project development within or near these surface water resources. While Table R2.5-8 and Table R2.5-9 in Appendix R2 suggest the potential development impacts to linear and areal surface water resources would be minimal on an overall basis within BLM lands in the DRECP area, representing potential impacts to 0.4% of linear and 2.3% of areal surface water resources, it is important to recognize the data limitations. Impacts to linear surface water features could potentially be underestimated since the available data is limited to only the centerline lengths rather than the areal extent of these features, as defined by their streambeds and channel banks and additional surface water features that have not been mapped.

Impact FH-3: Activities could result in accidental releases of contaminants resulting in degradation of water quality.

Section IV.5.3.1.1, No Action Alternative, presents a detailed description of Impact FH-3, which is common to all alternatives.

Impacts on Variance Process Lands

Variance Process Lands represent the BLM Solar PEIS Variance Lands as screened for the Proposed LUPA based on BLM screening criteria. Development of renewable energy projects on Variance Process Lands would not require LUPA; the environmental review process would be simpler than if the location were left undesignated. However, all solar, wind, and geothermal energy development applications would have to follow a variance process before BLM could determine whether to continue with processing them (see Volume II, Section II.3.3.3.2 for variance process details).

Development on Variance Process Lands would impact hydrologic resources in the same manner as described for impacts FH-1 through FH-3.

Impact Reduction Strategies

The implementation of the Proposed LUPA would result in conservation of some desert lands as well as development of renewable energy generation and transmission facilities on other lands. There are two ways that impacts from renewable energy development covered by the Proposed LUPA would be lessened. First, the Proposed LUPA incorporates CMAs for each alternative, including ecological and cultural conservation designations and other LUPA components. Second, the implementation of existing laws, orders, regulations and standards would reduce the impacts of project development on a project-by-project basis.

Design Features of the Solar PEIS

The Solar Programmatic EIS (PEIS) includes numerous Design Features (Appendix W) that would reduce the impacts of solar energy development, including measures to minimize erosion and runoff. These are the same as summarized for the No Project Alternative in Section IV.5.3.1.1.

Conservation and Management Actions

The conservation strategy for the Preferred Alternative (presented in Volume II, Section II.3.4) defines specific actions that would reduce the impacts of this alternative. The conservation strategy includes definition of the conservation designations and specific CMAs for the Preferred Alternative.

Similar among all action alternatives are CMAs that would effectively reduce impacts to surface water resources even though the potential impact exposure varies by the location of surface water in proximity to areas designated for development and conservation. The primary CMAs include:

- **LUPA-SW-1** Providing measures to protect the quantity and quality of all water resources (including ephemeral, intermittent, and perennial water bodies) and any associated riparian habitat.
- **LUPA-SW-2** Determining buffer zones, setbacks, and activity limitations that protect soil and water resources, on a site-specific basis;
- **LUPA-SW-14** Maintaining all riparian areas either at or brought to proper functioning.
- **LUPA-SW-17** Precluding construction within, or alteration of, 100-year floodplains where possible, and permitting only when all required permits from other agencies have been obtained. The 100-year floodplain would be determined by hydrologic modeling and analysis if not already determined by FEMA.

For any activity that proposes to utilize groundwater resources, the following stipulated CMAs would apply, regardless of project location:

- **LUPA-SW-21** If possible, all unavoidable impacts on surface waters shall be mitigated to ensure no net negative impact on surface waters.
- **LUPA-SW-22** Consideration shall be given to design alternatives that maintain existing hydrology of the site or redirect excess flows created by hardscapes and reduced permeability from surface waters to areas where they will dissipate by percolation into the landscape.
- **LUPA-SW-23** Degradation of water quality will be minimized by avoiding all hydrologic alterations that could reduce water quality for all applicable beneficial uses.

DRECP CMAs require that the siting and design of Covered Activities maintain the function of natural surface water processes, groundwater processes, hydrogeomorphic processes, and hydrologic regimes. Existing laws and regulations associated with wetlands and water features would also apply to Covered Activities. Additionally, the Riparian and Wetland Natural Communities and Covered Species CMAs will provide additional avoidance and minimization that will contribute to maintaining and promoting hydrologic function.

A summary of the Biological Resource CMAs influencing conservation of water resources and their associated values for all alternatives in the DRECP area is presented here:

- LUPA-BIO-3 would establish setbacks to avoid and buffer certain vegetation types, including but not limited to those in the riparian or wetland vegetation groups: seeps, springs, perennial and intermittent streams, wetlands, and agricultural canal and drain facilities. For the Mojave River, the setback would be the edge of the mapped riparian vegetation or the FEMA 100-year floodplain, whichever is greater.
- LUPA-BIO-9 would reduce impacts to water resources by implementing standard practices that would prevent water erosion and sediment transport and requiring proper containment of hazardous materials and wastes. This would include preparing a site-specific drainage, erosion, and sediment control plan for all phases of the project. It would also require that the siting and design of Covered Activities maintain the function of natural surface water processes, groundwater processes, hydrogeomorphic processes, and hydrologic regimes. Existing laws and regulations associated with wetlands and water features would also apply to Covered Activities.
- LUPA-BIO-14 would reduce the impacts of ground disturbance to water resources by requiring, to the maximum extent workable, that construction equipment and vehicles use existing roads and utility corridors and avoid cross-country travel. Within the project boundaries, cross-country vehicle and equipment use would be prohibited outside of approved designated work areas.

The BLM development standards within the CDCA address water quality so that surface water and groundwater comply with the Clean Water Act and other water quality requirements, including California standards, so that:

- The following do not exceed the applicable requirements: chemical constituents, water temperature, nutrient loads, fecal coliform, turbidity, suspended sediment, and dissolved oxygen.
- Standards are achieved for riparian, wetlands, and water bodies.
- Aquatic organisms and plants (e.g., macro-invertebrates, fish, algae, and plants) indicate support for beneficial uses.
- Monitoring results or other data show that water quality is meeting BLM standards.

The CMAs for the Preferred Alternative related to flood, hydrology and drainage areas would:

- Preclude construction within or alteration of 100-year floodplains where possible, and permitting only when all required permits from other agencies are obtained. The 100-year floodplain would be determined by hydrologic modeling and analysis if not already designated by FEMA.
- Establish exclusion areas in all wetlands, riparian areas (seeps, springs, perennial and intermittent streams), playas (dry lake beds), and Wild and Scenic River corridors, and limit effects to less than 5% of the total resource within project rights-of-way (ROWs), or those that can be adequately mitigated;
- Establish buffer zones, riparian setbacks, no-development areas, and others, determined on a site-specific basis. In general, placement of permanent facilities within buffers or protected zones will be discouraged, but may be permitted if water and riparian resource management objectives can be maintained and if critical resources including Threatened and Endangered species are fully protected.
- Sections 404 and 401 of the CWA and Fish and Game Code Section 1600 et seq. address dry washes within the proposed ROW that have been or likely will be federal or state jurisdictional waters.
- Section 402 of the CWA and Fish and Game Code Section 5650 et seq. will be followed for any activity determined to be a point source of pollution.
- Reduce ground disturbance to water resources by requiring to the maximum extent feasible that construction equipment and vehicles use existing roads and utility corridors and avoid cross-country travel. Within the project boundaries, cross-country vehicle and equipment use would be prohibited outside of approved work areas.
- Reduce impacts to water resources by implementing standard practices that would prevent water erosion and sediment transport and require proper containment of hazardous materials and wastes. This would include preparing a site-specific drainage, erosion and sediment control plan for all phases of the project.

Laws and Regulations

Similar to the No Action Alternative, existing laws and regulations will reduce certain impacts of Plan implementation. Relevant regulations are presented in the Regulatory Setting in Volume III. The requirements of relevant laws and regulations are summarized for the No Action Alternative in Section IV.5.3.1.1.

IV.5.3.2.2 Impacts of Ecological and Cultural Conservation and Recreation Designations

Setting aside lands for no disturbance is a beneficial effect for surface water resources because road crossings and ground disturbance would be avoided in the vicinities of linear and areal surface water resources. Exacerbation of flood effects and degradation of water quality would not occur because there would be no alteration to the drainage area and natural hydrologic processes within the 100-year floodplain. To the extent developments are avoided within drainage areas, they would also avoid potential contamination of soil and water from project-related hazardous materials and wastes.

As summarized in Table IV.5-4 (See Appendix R2 Table R2.5-10 for complete data), BLM's conservation designations could conserve about 54% of the mapped 100-year floodplain area on BLM lands in the DRECP area with the Preferred Alternative.

Table IV.5-4
Potential Conservation Within Mapped 100-Year Floodplain From Conservation Designations on BLM Lands in the DRECP Area (acres) – Preferred Alternative

SUMMARY: Potential Conservation of 100-year Floodplains on BLM Lands in the DRECP Area	NLCS	ACEC	Wildlife	Wilderness Characteristics	Trail	Total
Potential Conservation of 100-year Floodplains on BLM Lands in the DRECP area	67,448	10,115	40	11,911	16,346	105,860
Total 100-year Floodplains on BLM Lands in DRECP area	194,717	194,717	194,717	194,717	194,717	194,717
Percent of 100-year Floodplains Conserved on BLM Lands in the DRECP area	35%	5%	0%	6%	8%	54%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

As indicated in Table R2.5-11 and Table R2.5-12 (Appendix R2), BLM's conservation designations could exclude from development 70% of the 36,000 miles of linear features, and 34% of the 244,000 acres of areal surface water features on BLM lands in the DRECP area.

IV.5.3.2.3 Impacts of Transmission Outside the DRECP Area

The impacts of transmission outside the DRECP area on flooding, hydrology, and drainage would be the same under all alternatives. These impacts are as described for the No Action Alternative in Section IV.5.3.1.3, Impacts of Transmission Outside the DRECP Area in No Action Alternative.

IV.5.3.2.4 Comparison of the Preferred Alternative With No Action Alternative

This section summarizes the comparison of the Preferred Alternative with the No Action Alternative. While there is data that provide some basis for comparison, it is important to recognize that the No Action Alternative lacks guiding principles for locating facilities and would not result in the consistent and comprehensive application of CMAs as it would in the Preferred Alternative. The magnitude of detrimental environmental effects can therefore potentially be greater than for the No Action Alternative, regardless of results from the available metrics used to compare the alternatives.

A comparison follows of the Preferred and No Action Alternatives and how renewable energy development would impact water resources on BLM lands:

- The Preferred Alternative could allow development of up to 1.7% of the total mapped 100-year floodplain compared to 1.0% for the No Action Alternative.
- The Preferred Alternative could allow development of up to 0.4% of linear surface water features compared to 0.8% for the No Action Alternative.
- The Preferred Alternative could allow development of up to 2.3% of areal surface water features compared to 0.2% for the No Action Alternative.

Comparison of the Preferred and No Action Alternatives with respect to BLM's conservation designations of surface water resources follows:

- The Preferred Alternative could conserve 54% of the total mapped 100-year floodplain compared to 18% for the No Action Alternative.
- The Preferred Alternative could conserve 70% of linear surface water features compared to 17% for the No Action Alternative.
- The Preferred Alternative could conserve 34% of areal surface water features compared to 10% for the No Action Alternative.

IV.5.3.3 Alternative 1

For Alternative 1, geographically confined DFAs would be small, with an emphasis on solar and geothermal energy development. Additional conservation designations would be made through the LUPA.

Figure IV.5-3 shows the geographic distribution of both projects and conservation areas in relation to surface water resources for Alternative 1. Major surface water resources that could be developed under Alternative 1 include the Mojave and Colorado rivers.

IV.5.3.3.1 Impacts of Renewable Energy and Transmission Development: Alternative 1

The types of impacts that would occur for Alternative 1 would be similar to impacts for the No Action Alternative. Please see Section IV.5.3.1.1 for a more detailed description of impacts common to all alternatives.

Impact FH-1: Activities could substantially alter existing drainage patterns and increase the risk of flooding on or off site.

The following measure of potential activity within the 100-year floodplain shows potential adverse effects from development that could lead to substantially altering drainage patterns and increase the risk of flooding.

As summarized in Table IV.5-5 for Alternative 1 (see Appendix R2 Table R2.5-13 for complete data), development within currently assessed 100-year floodplains on BLM lands in the DRECP area could occupy about 502 acres. This represents about 0.4% of the total mapped 100-year floodplain area of BLM lands in the DRECP area. Solar energy represents about three quarters of this small percentage of potential development that could be built within the mapped 100-year floodplain, mostly in the Imperial Borrego Valley, Pinto Lucerne Valley and Eastern Slopes, and West Mojave and Eastern Slopes ecoregion subareas. As assessed currently, this would suggest that development within the 100-year floodplain on BLM lands in the DRECP area would not adversely impact 99% of the 100-year floodplain. However, it is important to recognize that, overall, 72% of the DRECP area has not been assessed for flood potential, suggesting that development on BLM lands within the 100-year floodplain could occupy more than 0.4%. The CMAs would require areas that have not been previously assessed by FEMA to undergo hydrologic study to determine the 100-year floodplain in proximity to the project, and to avoid development within the floodplain if possible.

Table IV.5-5
Potential Development Within Mapped 100-Year Floodplains on BLM Lands in the DRECP Area (acres) – Alternative 1

	Solar	Wind	Geothermal	Transmission	Total
Potential Development Within 100-year Floodplains on BLM Lands in DRECP Area	343	0	42	116	502
Total 100-year Floodplains on BLM Lands in the DRECP Area	132,595	132,595	132,595	132,595	132,595
Percent of 100-Year Floodplains Potentially Developed on BLM Lands in the DRECP Area	0.3%	0.0%	0.0%	0.1%	0.4%

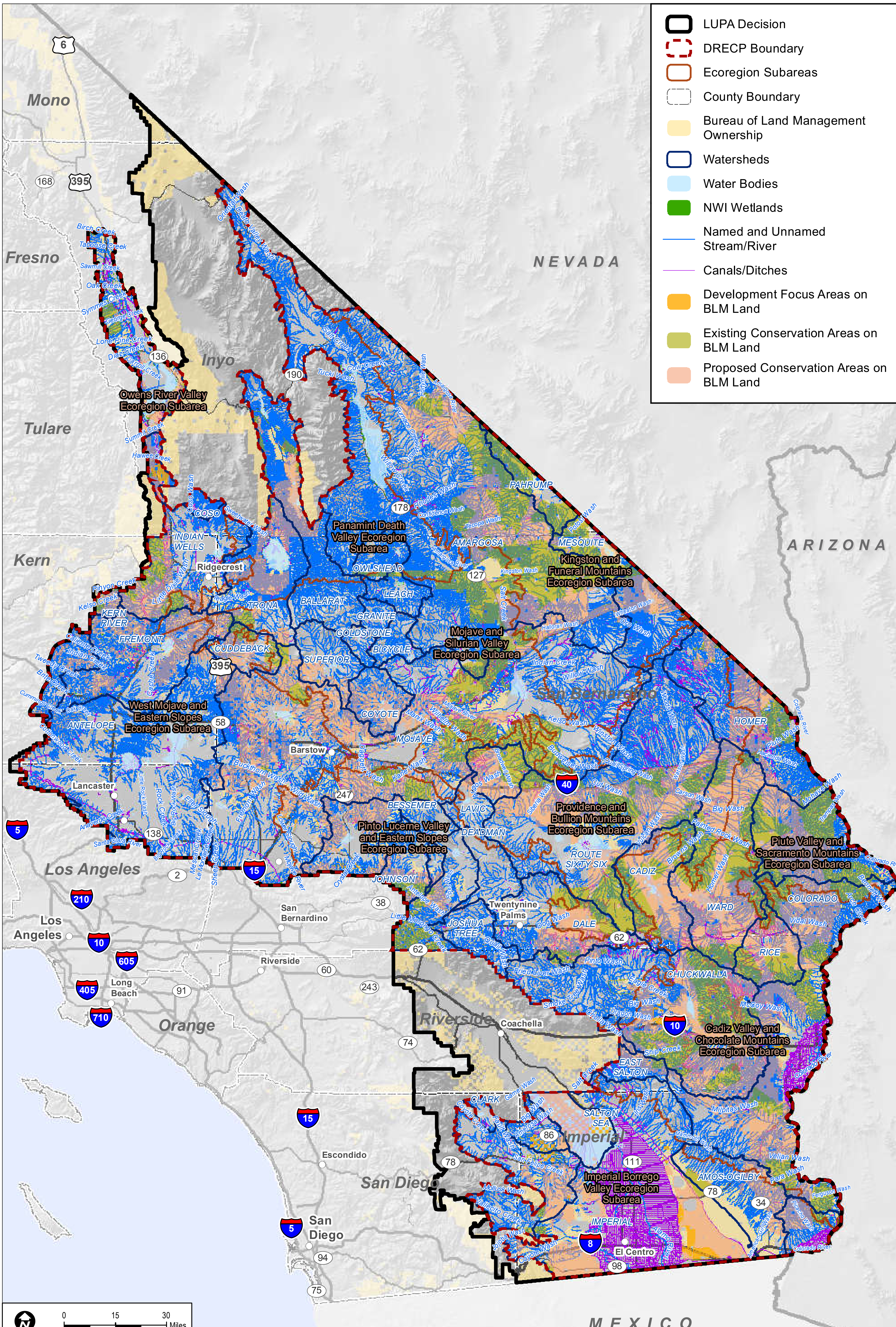
Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

Impact FH-2: Activities could alter hydrologic processes and water-dependent resources of surface water features.

The following measures of potential activity within surface water features indicate potential adverse impacts from development within or near these surface water resources. While Table R2.5-14 and Table R2.5-15 in Appendix R2 suggest that potential development impacts to linear and areal surface water resources would be minimal overall within BLM lands in the DRECP area (representing potential impacts to 0.3% of linear and 0.1% of areal surface water resources), it is important to recognize the data limitations. There is the potential to underestimate impacts to linear surface water features since available data is limited to centerline lengths rather than to the areal extent of these features, as defined by their streambeds and channel banks.

Impact FH-3: Activities could result in accidental releases of contaminants resulting in degradation of water quality.

Please see Section IV.5.3.1 for the No Action Alternative for a more detailed description of Impact FH-3.



Sources: ESRI (2014); CEC (2013); BLM (2015); CDFW (2013); USFWS (2013); USGS (2011); RECON (2015)

FIGURE IV.5-3

Linear and Areal Surface Water Resources and Watersheds in the DRECP Plan Area - Alternative 1

DRECP Proposed LUPA and Final EIS

October 2015

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Impacts on Variance Process Lands

Variance Process Lands represent BLM Solar PEIS Variance Lands screened for the Proposed LUPA, based upon BLM screening criteria. Development of renewable energy on Variance Process Lands would not require LUPA; the environmental review process would be simpler than if the location were left undesignated. However, all solar, wind, and geothermal energy development applications would have to follow a variance process before BLM could determine whether to continue with processing them (see Volume II, Section II.3.3.3.2 for details of the variance process).

Under Alternative 1, there are 37,000 acres of Variance Process Lands in the LUPA Decision Area. Development on Variance Process Lands would impact hydrologic resources in the same manner as described for impacts FH-1 through FH-3.

Impact Reduction Strategies

The implementation of the Proposed LUPA would result in the conservation of some desert lands as well as the development of renewable energy generation and transmission facilities on other lands. There are several ways that impacts from renewable energy development covered by the Proposed LUPA would be lessened. First, the Proposed LUPA incorporates CMAs for each alternative, including specific ecological and cultural conservation designations. Also, the implementation of existing laws, orders, regulations and standards would reduce the impacts of project development.

Design Features of the Solar PEIS

The Solar PEIS includes numerous Design Features (Appendix W) that would reduce impacts of solar energy development, including measures to minimize erosion and runoff. These are the same as summarized for the No Project Alternative in Section IV.5.3.1.1.

Conservation and Management Actions

The conservation strategy for Alternative 1 (presented in Volume II, Section II.4.4) defines specific actions that would reduce the impacts of this alternative. The conservation strategy includes definition of the conservation designations and specific CMAs, as defined for the Preferred Alternative in Section IV.5.3.2.1.

Laws and Regulations

Similar to the No Action Alternative, existing laws and regulations will reduce certain impacts of Plan implementation. Relevant regulations are presented in the Regulatory

Setting in Volume III. The requirements of relevant laws and regulations are summarized for the No Action Alternative in Section IV.5.3.1.1.

IV.5.3.3.2 Impacts of Ecological and Cultural Conservation and Recreation Designations

Setting aside lands for no disturbance is a beneficial effect for surface water resources because road crossings and ground disturbance would be avoided within and in the vicinity of linear and areal surface water resources. Exacerbation of flood effects and degradation of water quality would not occur because there would not be any alteration to the drainage area and natural hydrologic processes within the 100-year floodplain. To the extent development is avoided within drainage areas, it would also avoid potential for contamination to soil and water from project-related hazardous materials and wastes.

As summarized in Table IV.5-6 (see Appendix R2 Table R2.5-16 for complete data), BLM's conservation designations could conserve about 65% of the area of mapped 100-year floodplain on BLM lands in the DRECP area associated with Alternative 1.

Table IV.5-6
Potential Conservation of Mapped 100-Year Floodplain from Conservation Designations on BLM Lands in the DRECP Area (acres) – Alternative 1

SUMMARY: Potential Conservation of 100-year Floodplains on BLM Lands in the DRECP Area	NLCS	ACEC	Wildlife	Wilderness Characteristics	Trail	Total
Potential Conservation of 100-year Floodplains on BLM Lands in the DRECP Area	21,204	44,646	5,005	13,174	2,293	86,322
Total 100-year Floodplain Acreage on BLM Lands in DRECP Area	132,595	132,595	132,595	132,595	132,595	132,595
Percent of 100-year Floodplains that Could be Conserved on BLM Lands in the DRECP Area	16.0%	33.7%	3.8%	9.9%	1.7%	65.1%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

As indicated in Table R2.5-17 and Table R2.5-18 (in Appendix R2), BLM's conservation designations would exclude from development 64% of the linear surface water features among the total 36,000 miles of linear features, and would exclude from development 58% of the areal surface water features among the total 182,000 acres of areal surface water features on BLM lands in the DRECP area.

IV.5.3.3.3 Impacts of Transmission Outside the DRECP Area

The impacts of transmission outside the DRECP area on flooding, hydrology, and drainage would be the same under all alternatives. These impacts are as described for the No Action Alternative in Section IV.5.3.1.3, Impacts of Transmission Outside the DRECP area, in the No Action Alternative.

IV.5.3.3.4 Comparison of Alternative 1 With Preferred Alternative

A comparison of Alternative 1 and the Preferred Alternative for potential BLM DRECP area development impacts to surface water resources follows:

- Alternative 1 could allow development of up to 0.4% of the total mapped 100-year floodplain compared to 1.7% for the Preferred Alternative.
- Alternative 1 could allow development of up to 0.3% of linear surface water features compared to 0.4% for the Preferred Alternative.
- Alternative 1 could allow development of up to 0.1% of areal surface water features compared to 2.3% for the Preferred Alternative.

Comparison of Alternative 1 and the Preferred Alternative with respect to conservation of surface water resources resulting from conservation designations on BLM lands in the DRECP area follows:

- Alternative 1 could conserve 65% of the total mapped 100-year floodplain compared to 54% for the Preferred Alternative.
- Alternative 1 could conserve 64% of linear surface water features compared to 70% for the Preferred Alternative.
- Alternative 1 could conserve 58% of areal surface water features compared to 34% for the Preferred Alternative.

IV.5.3.4 Alternative 2

For Alternative 2, geographically dispersed and maximized DFAs would have expanded wind energy development opportunities. Additional conservation designations would be made through the LUPA.

Figure IV.5-4 shows the geographic distribution of renewable energy development and conservation areas in relation to surface water resources for Alternative 2. Major surface water resources that could experience development in their vicinity under Alternative 2 include the Mojave and Colorado rivers.

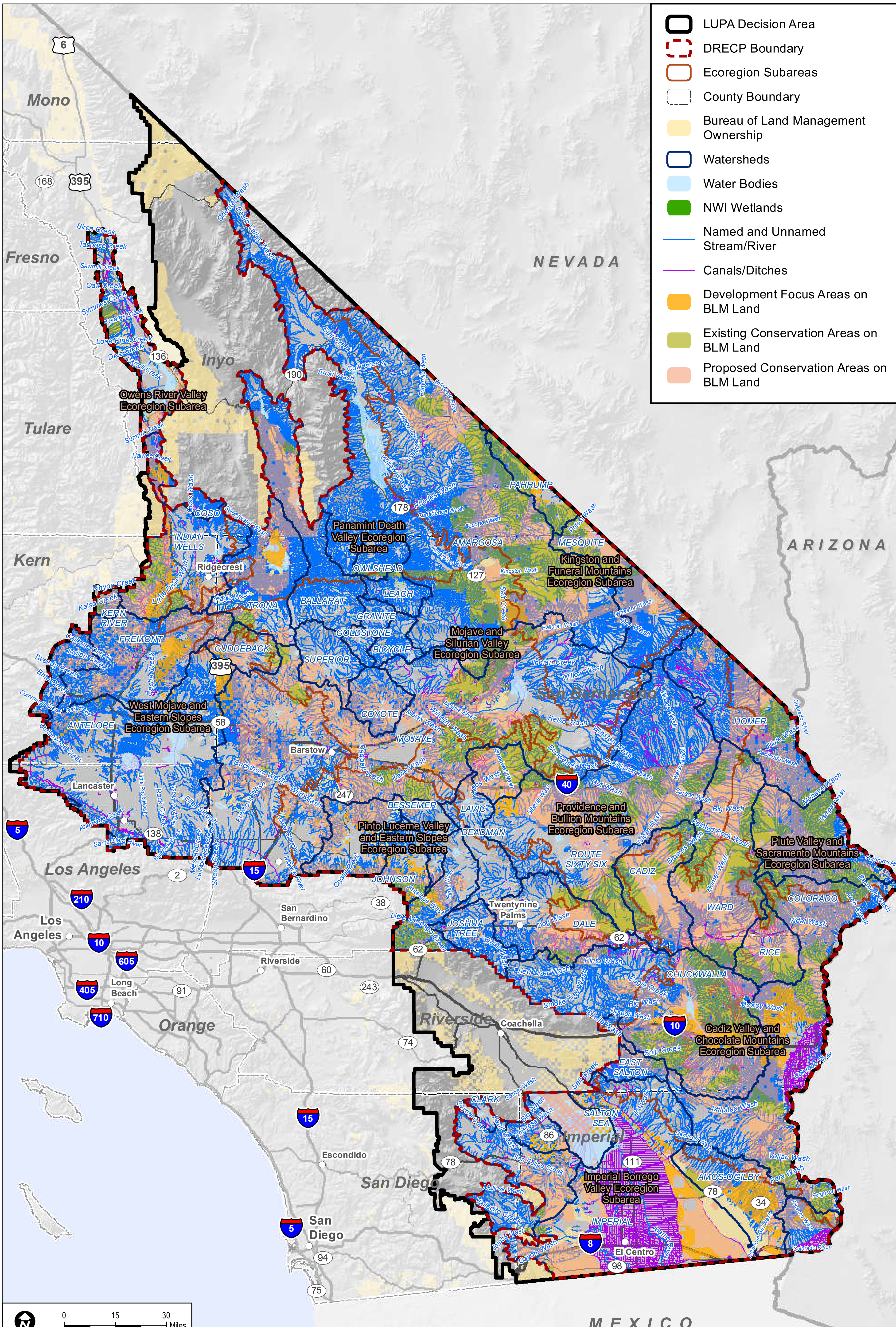
IV.5.3.4.1 Impacts of Renewable Energy and Transmission Development : Alternative 2

The types of impacts that would occur for Alternative 2 would be similar to impacts for the No Action Alternative. Please see Section IV.5.3.1.1 for a more detailed description of impacts common to all alternatives.

Impact FH-1: Activities could substantially alter existing drainage patterns and increase the risk of flooding on or off site.

The following measure of potential activity within the mapped 100-year floodplain indicates the potential adverse effects from development that could lead to substantially altering drainage patterns and increasing the risk of flooding.

As summarized in Table IV.5-7 (see Appendix R2 Table R2.5-19 for complete data), development within the 100-year floodplain on BLM lands in the DRECP area could occupy about 2,062 acres. This represents less than 2% (1.6%) of the total mapped 100-year floodplain on BLM lands in the DRECP area. Solar energy represents about three quarters of this small percentage of potential development. As assessed currently, this would suggest that development within the 100-year floodplain on BLM lands in the DRECP area would avoid impacting 98% of this area. However, it is important to recognize that, overall, 72% of BLM lands in the DRECP area has not been assessed for flood potential, suggesting that development within the 100-year floodplain could occupy more than 2% of the total floodplain. The CMAs require areas that have not been previously assessed by FEMA to undergo hydrologic study to determine the 100-year floodplain in proximity to the project, and to avoid development within the floodplain if possible.



Sources: ESRI (2014); CEC (2013); BLM (2015); CDFW (2013); USFWS (2013); USGS (2011); RECON (2015)

FIGURE IV.5-4

Linear and Areal Surface Water Resources and Watersheds in the DRECP Plan Area - Alternative 2

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Table IV.5-7
Potential Development Within Mapped 100-Year Floodplains on BLM Lands in the DRECP Area (acres) – Alternative 2

	Solar	Wind	Geothermal	Transmission	Total
Potential Development Within 100-year Floodplains on BLM Lands in DRECP Area	1,691	129	120	122	2,062
Total 100-year Floodplains on BLM Lands within DRECP Area	132,595	132,595	132,595	132,595	132,595
Percent of Potential Development in 100-Year Floodplains on BLM Lands within DRECP Area	1.3%	0.1%	0.1%	0.1%	1.6%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

Impact FH-2: Activities could alter hydrologic processes and water-dependent resources of surface water features.

The following measures of potential activity within surface water features indicate the potential adverse effects from development within or near these resources. While Table R2.5-20 and Table R2.5-21 in Appendix R2 suggest that potential development impacts to linear and areal surface water resources would be minimal overall within BLM lands in the DRECP area (representing potential impacts to 0.5% of linear and 1.6% of areal surface water resources), it is important to recognize the data limitations. There is the potential to underestimate impacts to linear surface water features since available data is limited to only the centerline lengths rather than to the areal extent of these features, as defined by their streambeds and channel banks.

Impact FH-3: Activities could result in accidental releases of contaminants resulting in degradation of water quality.

Please see Section IV.5.3.1.1 for the No Action Alternative for a more detailed description of Impact FH-3 since it is common to all alternatives.

Impacts on Variance Process Lands

Variance Process Lands represent the BLM Solar PEIS Variance Lands as screened for the Proposed LUPA based on BLM screening criteria. Development of renewable energy on Variance Process Lands would not require a LUPA; the environmental review process would be somewhat simpler than if the location were left undesignated. However, all solar, wind, and geothermal energy development applications would have to follow a variance process before BLM could determine whether to continue with processing them. (See Volume II, Section II.3.3.3.2 for details of the variance process.)

Development on Variance Process Lands would impact hydrologic resources in the same manner as described for impacts FH-1 through FH-3.

Impact Reduction Strategies

The implementation of the Proposed LUPA would result in conservation of some desert lands as well as the development of renewable energy generation and transmission facilities on other lands. There are two ways that impacts from renewable energy development covered by the Proposed LUPA would be lessened. First, the Proposed LUPA incorporates CMAs for each alternative, including specific ecological and cultural conservation designations and LUPA components. Second, implementation of existing laws, orders, regulations and standards would reduce the impacts of project development.

Design Features of the Solar PEIS

The Solar PEIS includes numerous Design Features (Appendix W) that would reduce the impacts of solar energy development, including measures to minimize erosion and runoff. There are the same as summarized for the No Project Alternative in Section IV.5.3.1.1.

Conservation and Management Actions

The conservation strategy for Alternative 2 (presented in Volume II, Section II.5.4) defines specific actions that would reduce the impacts of this alternative. The conservation strategy defines ecological and cultural conservation designations and specific CMAs for the Preferred Alternative. The CMAs for Alternative 2 are similar to those for the Preferred Alternative. Please see Section IV.5.3.2.1.

Laws and Regulations

Similar to the No Action Alternative, existing laws and regulations will reduce certain impacts of Plan implementation. Relevant regulations are presented in the Regulatory Setting in Volume III. The requirements of relevant laws and regulations are summarized for the No Action Alternative in Section IV.5.3.1.1.

IV.5.3.4.2 Impacts of Ecological and Cultural Conservation and Recreation Designations

Setting aside lands for no disturbance is a beneficial effect for surface water resources because road crossings and ground disturbance would be avoided in the vicinities of linear and areal surface water resources. Exacerbation of flood effects and degradation of water quality would not occur because there would not be any alteration to the drainage area and natural hydrologic processes within the 100-year floodplain. To the extent developments are avoided within drainage areas, it would also avoid potential for contamination to soil and water from project-related hazardous materials and wastes.

As summarized in Table IV.5-8 (see Appendix R2, Table R2.5-22 for complete data), BLM's conservation designations could conserve about 94% the area of mapped 100-year floodplain on BLM lands in the DRECP area associated with Alternative 2.

Table IV.5-8
Potential Conservation of Mapped 100-Year Floodplain from Conservation Designations on BLM Lands in the DRECP Area (acres) – Alternative 2

SUMMARY: Potential Conservation of 100-year Floodplains on BLM Land in DRECP Area	NLCS	ACEC	Wildlife Allocation	Wilderness Characteristics	Trail	Total
Potential Conservation in 100-year Floodplains on BLM Lands	74,062	3,627	1	13,174	33,293	124,157
Total 100-year Floodplains on BLM Lands in the DRECP Area	132,595	132,595	132,595	132,595	132,595	132,595
Percent of 100-year Floodplains that Could be Conserved on BLM Lands in DRECP Area	55.9%	2.7%	0.0%	9.9%	25.1%	93.6%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

As indicated in Table R2.5-23 and Table R2.5-24 (Appendix R2), BLM's conservation designations could exclude from development 93% of the 36,000 miles of the linear surface water features and 72% of the 182,000 acres of areal surface water features on BLM lands in the DRECP area.

IV.5.3.4.3 Impacts of Transmission Outside the DRECP Area

The impacts of transmission outside the DRECP area on flooding, hydrology, and drainage would be the same under all alternatives. These impacts are as described for the No Action Alternative in Section IV.5.3.1.3, Impacts of Transmission Outside the DRECP Area in No Action Alternative.

IV.5.3.4.4 Comparison of Alternative 2 With Preferred Alternative

A comparison of Alternative 2 and the Preferred Alternative with respect to potential BLM DRECP area development impacts to surface water resources follows:

- Alternative 2 could allow development of up to 1.6% of the total mapped 100-year floodplain compared to 1.7% for the Preferred Alternative.
- Alternative 2 could allow development of up to 0.5% of linear surface water features compared to 0.4% for the Preferred Alternative.
- Alternative 2 could allow development of up to 1.6% of areal surface water features compared to 2.3% for the Preferred Alternative.

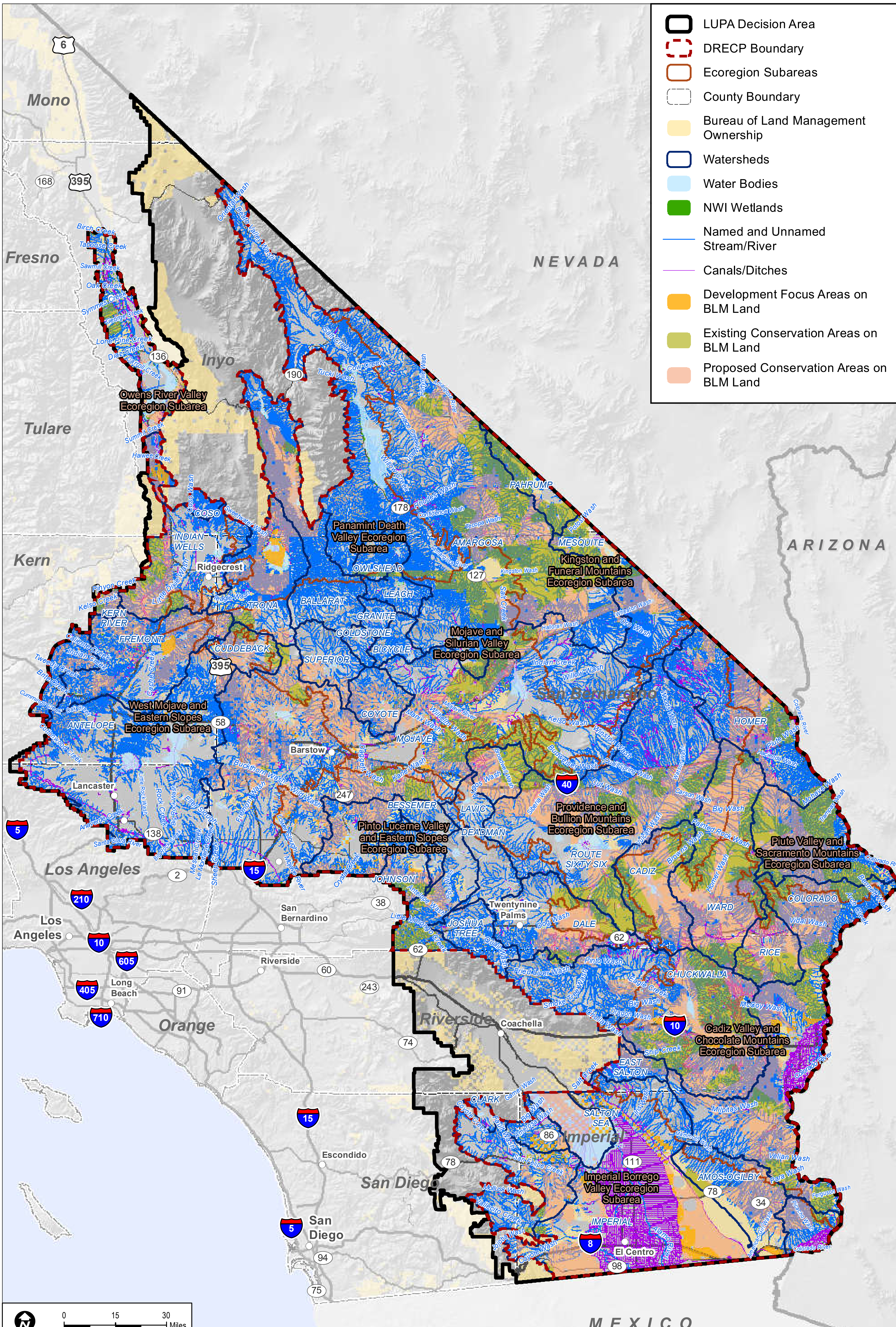
Comparison of Alternative 2 and the Preferred Alternative with respect to conservation of surface water resources resulting from Conservation Designations on BLM lands in the DRECP area follows:

- Alternative 2 could conserve 94% of the total mapped 100-year floodplain compared to 54% for the Preferred Alternative.
- Alternative 2 could conserve 93% of linear surface water features compared to 70% for the Preferred Alternative.
- Alternative 2 could conserve72% of areal surface water features compared to 34% for the Preferred Alternative.

IV.5.3.5 Alternative 3

For Alternative 3, geographically dispersed DFAs would be established primarily for solar and geothermal energy development. Additional conservation designations would be made through the LUPA.

Figure IV.5-5 shows the geographic distribution of renewable energy development and conservation areas in relation to surface water resources for Alternative 3. Major surface water resources that could experience development under Alternative 3 include the Mojave and Colorado rivers.



Sources: ESRI (2014); CEC (2013); BLM (2015); CDFW (2013); USFWS (2013); USGS (2011); RECON (2015)

FIGURE IV.5-5

Linear and Areal Surface Water Resources and Watersheds in the DRECP Plan Area - Alternative 3

DRECP Proposed LUPA and Final EIS

October 2015

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IV.5.3.5.1 Impacts of Renewable Energy and Transmission Development: Alternative 3

The types of impacts that would occur for Alternative 3 would be similar to impacts for the No Action Alternative. Please see Section IV.5.3.1.1 for a more detailed description of impacts common to all alternatives.

Impact FH-1: Activities could substantially alter existing drainage patterns and increase the risk of flooding on or off site.

The following measure of potential activity within the mapped 100-year floodplain indicates the potential adverse impacts from development that could lead to substantially altering drainage patterns and increasing the risk of flooding.

As summarized in Table IV.5-9 (see Appendix R2, Table R2.5-25 for complete data), development within the DFA would occupy about 2,141 acres of lands currently assessed as within the mapped 100-year floodplain. This represents about 2% of the total mapped 100-year floodplain area in BLM lands in the DRECP area. Solar energy represents most of this small percentage of potential development that could occur within the mapped 100-year floodplain, mostly in the Imperial Borrego Valley and West Mojave and Eastern Slopes ecoregion subareas. As assessed currently, this would suggest that development within the 100-year floodplain on BLM lands in the DRECP area would avoid impacting 98% of the 100-year floodplain. However, it is important to recognize that overall, 72% of the DRECP area has not been assessed for flood potential, suggesting that development within the 100-year floodplain could occupy more than 2% of the total area of the DFA. The CMAs would require areas that have not been previously assessed by FEMA to undergo hydrologic study to determine the 100-year floodplain in proximity to the project, and to avoid development within the floodplain if possible.

Table IV.5-9
Potential Development Within Mapped 100-Year Floodplains on BLM Lands in the DRECP Area (acres) – Alternative 3

	Solar	Wind	Geothermal	Transmission	Total
Potential Development Within 100-year Floodplains on BLM Lands in DRECP Area	1,829	62	131	119	2,141
Total 100-year Floodplains on BLM Lands in DRECP Area	132,595	132,595	132.595	132,595	132.595
Percent of 100-Year Floodplains that Could be Developed on BLM Lands in the DRECP Area	1.4%	0.0%	0.1%	0.1%	1.6%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the

nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

Impact FH-2: Activities could alter hydrologic processes and water-dependent resources of surface water features.

The following measures of potential activity within surface water features indicate potential adverse impacts from development within or near these surface water resources. While Table R2.5-26 and Table R2.5-27 (in Appendix R2) suggest that potential development impacts to linear and areal surface water resources would be minimal overall within BLM lands in the DRECP area, representing potential impacts to 0.3% of linear and 2.1% of areal surface water resources, it is important to recognize the data limitations. There is the potential to underestimate impacts to linear surface water features since available data is limited to centerline lengths rather than to the areal extent of these features, as defined by their streambeds and channel banks.

Impact FH-3: Activities could result in accidental releases of contaminants resulting in degradation of water quality.

Please see Section IV.5.3.1.1 for the No Action Alternative for a more detailed description of Impact FH-3 since it is common to all alternatives.

Impacts on Variance Process Lands

Variance Process Lands represent the BLM Solar PEIS Variance Lands screened for the Proposed LUPA based on BLM screening criteria. Development of renewable energy on Variance Process Lands would not require a LUPA; the environmental review process would be somewhat simpler than if the location were left undesignated. However, all solar, wind, and geothermal energy development applications would have to follow a variance process before the BLM could determine whether to continue with processing them. (See Volume II, Section II.3.3.3.2 for details of the variance process.)

Development on Variance Process Lands would impact hydrologic resources in the same manner as described for impacts FH-1 through FH-3.

Impact Reduction Strategies

The implementation of the Proposed LUPA would result in conservation of some desert lands as well as the development of renewable energy generation and transmission facilities on other lands. There are several ways in which impacts from renewable energy development covered by the Proposed LUPA would be lessened. First, the Proposed LUPA incorporates CMAs for each alternative, including specific ecological and cultural conservation designations and LUPA components. Also, the implementation of existing laws, orders, regulations and standards would reduce the impacts of project development.

Design Features of the Solar PEIS

The Solar PEIS includes numerous Design Features (Appendix W) that would reduce the impacts of solar energy development, including measures to minimize erosion and runoff. These are the same as summarized for the No Project Alternative in Section IV.5.3.1.1.

Conservation and Management Actions

The conservation strategy for Alternative 3 (presented in Volume II, Section II.6.4) defines specific actions that would reduce the impacts of this alternative. The conservation strategy includes definition of the ecological and cultural conservation designations and specific CMAs for the Preferred Alternative. The CMAs for Alternative 3 are similar to those for the Preferred Alternative. Please see Section IV.5.3.2.1.1.

Laws and Regulations

Similar to the No Action Alternative, existing laws and regulations will reduce certain impacts of Plan implementation. Relevant regulations are presented in the Regulatory Setting in Volume III. The requirements of relevant laws and regulations are summarized for the No Action Alternative in Section IV.5.3.1.1.

IV.5.3.5.2 Impacts of Ecological and Cultural Conservation and Recreation Designations

Setting aside lands for no disturbance is a beneficial effect for surface water resources because road crossings and ground disturbance would be avoided in the vicinities of linear and areal surface water resources. Exacerbation of flood effects and degradation of water quality would not occur because there would not be any alteration to the drainage area and natural hydrologic processes within the 100-year floodplain. To the extent developments are avoided within drainage areas, it would also avoid potential for contamination to soil and water from project-related hazardous materials and wastes.

As summarized in Table IV.5-10 (see Appendix R2, Table R2.5-28 for complete data), BLM's conservation designations would conserve about 83% of the area of mapped 100-year floodplain on BLM lands in the DRECP area associated with Alternative 3.

Table IV.5-10
Potential Conservation of Mapped 100-Year Floodplain from Conservation Designations on BLM Lands in the DRECP Area (acres) – Alternative 3

	NLCS	ACEC	Wildlife	Wilderness Characteristics	Trail	Total
Potential Conservation of 100-year Floodplains on BLM Lands in the DRECP Area	70,615	6,545	42	13,174	19,984	110,360
Total 100-year Floodplains on BLM Lands in the DRECP Area	132,595	132,595	132,595	132,595	132,595	132,595
Percent of 100-year Floodplains that Could be Conserved on BLM Lands in the DRECP Area	53.2%	4.9%	0.0%	9.9%	15.1%	83.2%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

As indicated in Table R2.5-29 and Table R2.5-30 (Appendix R2), BLM's conservation designations could exclude from development 79% of the 36,000 miles of linear features, and 64% of the 182,000 acres of areal surface water features on BLM lands in the DRECP area.

IV.5.3.5.3 Impacts of Transmission Outside the DRECP Area

The impacts of transmission outside the DRECP area on flooding, hydrology, and drainage would be the same under all alternatives. These impacts are as described for the No Action Alternative in Section IV.5.3.1.3, Impacts of Transmission Outside the DRECP Area in No Action Alternative.

IV.5.3.5.4 Comparison of Alternative 3 With Preferred Alternative

Comparison of Alternative 3 and the Preferred Alternative with respect to the potential for BLM DRECP area development impacts to surface water resources follows:

- Alternative 3 could allow development of up to 1.6% of the total mapped 100-year floodplain compared to 1.7% for the Preferred Alternative.

- Alternative 3 could allow development of up to 0.3% of linear surface water features compared to 0.4% for the Preferred Alternative.
- Alternative 3 could allow development of up to 2.1% of areal surface water features compared to 2.3% for the Preferred Alternative.

Comparison of Alternative 3 and the Preferred Alternative with respect to conservation of surface water resources resulting from conservation designations on BLM lands in the DRECP follows:

- Alternative 3 could conserve 83% of the total mapped 100-year floodplain compared to 83.5% for the Preferred Alternative.
- Alternative 3 could conserve 79% of linear surface water features compared to 78.2% for the Preferred Alternative.
- Alternative 3 could conserve 64% of areal surface water features compared to 54.4% for the Preferred Alternative.

IV.5.3.6 Alternative 4

For Alternative 4, geographically dispersed DFAs would be designated with a mix of solar, wind and geothermal energy development. Additional conservation designations would be made through the LUPA.

Figure IV.5-6 shows the geographic distribution of renewable energy development and conservation areas in relation to surface water resources for Alternative 4. Major surface water resources that could be developed in their vicinities under Alternative 4 include the Mojave and Colorado rivers.

IV.5.3.6.1 Impacts of Renewable Energy and Transmission Development: Alternative 4

The types of impacts that would occur for Alternative 4 would be similar to impacts for the No Action Alternative. Please see Section IV.5.3.1.1 for a more detailed description of impacts common to all alternatives. The following assessment is limited to alternative-specific measures.

Impact FH-1: Activities could substantially alter existing drainage patterns and increase the risk of flooding on or off site.

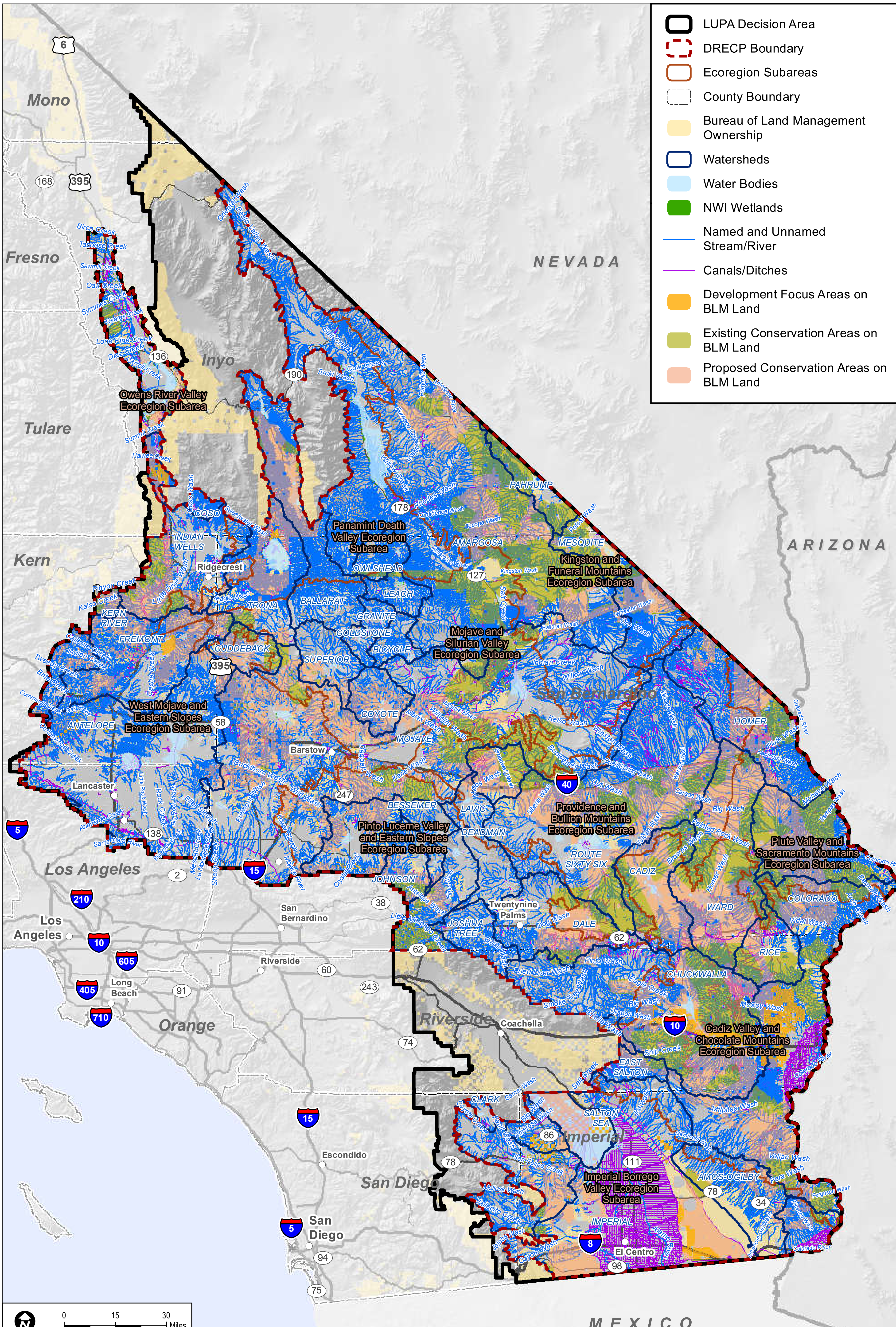
The following measure of potential activity within the mapped 100-year floodplain indicates the potential adverse impacts that could lead to substantially altering drainage patterns and increasing the risk of flooding.

As summarized in Table IV.5-11 (see Appendix R2, Table R2.5-31 for complete data), development within BLM lands in the DRECP area could occupy about 1,352 acres of lands currently assessed as being within the mapped 100-year floodplain. This represents about 1% of the total mapped 100-year floodplain on BLM lands in the DRECP area. Solar energy represents almost three quarters of this small percentage of potential development that could occur within the mapped 100-year floodplain, mostly in the Cadiz Valley and Chocolate Mountains, with less in Imperial Borrego Valley, and West Mojave and Eastern Slopes ecoregion subareas. As assessed currently, this would suggest that development within the 100-year floodplain on BLM lands in the DRECP area would avoid impacting 99% of the 100-year floodplain. However, it is important to recognize that overall, 72% of BLM land in the DRECP area has not been assessed for flood potential, suggesting that development within the 100-year floodplain could occupy more than 1%. The CMAs would require areas that have not been previously assessed by FEMA to undergo hydrologic study to determine the 100-year floodplain in proximity to the project, and to avoid development within the floodplain if possible.

Table IV.5-11
Potential Development Within Mapped 100-Year Floodplains on BLM Lands in the DRECP Area (acres) – Alternative 4

	Solar	Wind	Geothermal	Transmission	Total
Potential Development Within 100-year Floodplains on BLM Lands in the DRECP Area	1,048	79	124	101	1,352
Total 100-year Floodplains on BLM Lands in the DRECP Area	132,595	132,595	132,595	132,595	132,595
Percent of 100-year Floodplains That Could be Developed on BLM Lands in the DRECP Area	0.8%	0.1%	0.1%	0.1%	1.0%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.



Sources: ESRI (2014); CEC (2013); BLM (2015); CDFW (2013); USFWS (2013); USGS (2011); RECON (2015)

FIGURE IV.5-6

Linear and Areal Surface Water Resources and Watersheds in the DRECP Plan Area - Alternative 4

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Impact FH-2: Activities could alter hydrologic processes and water-dependent resources of surface water features.

The following measures of potential activity within surface water features indicate the potential adverse effects from development within or near these surface water resources.

While Table R2.5-32 and Table R2.5-33(in Appendix R2) suggest the potential development impacts to linear and areal surface water resources would be minimal on an overall basis within BLM lands of the DRECP area, representing potential impacts to 0.3% of linear and 1.4% of areal surface water resources, it is important to recognize the data limitations. There is the potential to underestimate impacts to linear surface water features since the available data is limited to considering only centerline lengths rather than the areal extent of these features as defined by their streambeds and channel banks.

Impact FH-3: Activities could result in accidental releases of contaminants resulting in degradation of water quality.

Please see Section IV.5.3.1.1 for the No Action Alternative for a more detailed description of Impact FH-3 since it is common to all alternatives.

Impacts on Variance Process Lands

Variance Process Lands represent the BLM Solar PEIS Variance Lands as screened for the Proposed LUPA based on BLM screening criteria. Development of renewable energy on Variance Process Lands would not require a LUPA; the environmental review process would be somewhat simpler than if the location were left undesignated. However, all solar, wind, and geothermal energy development applications would have to follow a variance process before the BLM would determine whether to continue with processing them. (See Volume II, Section II.3.3.3.2 for details of the variance process.)

Development on Variance Process Lands would impact hydrologic resources in the same manner as described for impacts FH-1 through FH-3.

Impact Reduction Strategies

The implementation of the Proposed LUPA would result in conservation of some desert lands as well as the development of renewable energy generation and transmission facilities on other lands. There are two ways in which the impacts of the renewable energy development covered by the Proposed LUPA would be lessened. First, the Proposed LUPA incorporates CMAs for each alternative, including specific ecological and cultural conservation designations and other LUPA components. Second, the implementation of existing laws, orders, regulations and standards would reduce the impacts of project development.

Design Features of the Solar PEIS

The Solar PEIS includes numerous Design Features (Appendix W) that would reduce the impacts of solar energy development, including measures to minimize erosion and runoff. These are the same as summarized for the No Project Alternative in Section IV.5.3.1.1

Conservation and Management Actions

The conservation strategy for Alternative 4 (presented in Volume II, Section II.7.4) defines specific actions that would reduce the impacts of this alternative. The conservation strategy includes definition of the conservation designations and specific CMAs for the Preferred Alternative. The CMAs for Alternative 4 are similar to those for the Preferred Alternative. Please see Section IV.5.3.2.1.

Laws and Regulations

Similar to the No Action Alternative, existing laws and regulations will reduce certain impacts of Plan implementation. Relevant regulations are presented in the Regulatory Setting in Volume III. The requirements of relevant laws and regulations are summarized for the No Action Alternative in Section IV.5.3.1.1.

IV.5.3.6.2 Impacts of Ecological and Cultural Conservation and Recreation Designations

Setting aside lands for no disturbance is a beneficial effect for surface water resources because road crossings and ground disturbance would be avoided in the vicinity of linear and areal surface water resources. Exacerbation of flood effects and degradation of water quality would not occur because there would not be any alteration to the drainage area and natural hydrologic processes within the 100-year floodplain. To the extent that developments are avoided within drainage areas, it would also avoid potential for contamination to soil and water from project-related hazardous materials and wastes.

As summarized in Table IV.5-12 (see Appendix R2, Table R2.5-34 for complete data), BLM's conservation designations could conserve about 65% of the area of mapped 100-year floodplain on BLM lands in the DRECP area associated with Alternative 4.

Table IV.5-12
Potential Conservation of Mapped 100-Year Floodplain From Conservation Designations on BLM Lands in the DRECP Area (acres) – Alternative 4

	NLCS	ACEC	Wilderness Characteristics	Wildlife Allocations	Trail Mgmt	Total
Potential Conservation of 100-year Floodplains on BLM Lands in the DRECP Area	58,272	7,925	13,176	71	6,903	86,347
Total 100-year Floodplains on BLM Lands in the DRECP Area	132,595	132,595	132,595	132,595	132,595	132,595
Percent of 100-year Floodplains that could be Conserved on BLM Lands in the DRECP Area	44%	6.0%	9.9%	0.0%	5.2%	65.1%

Note: Full data tables are available in Appendix R2.
The following general rounding rules were applied to calculated values: values greater than 1,000 were rounded to the nearest 1,000; values less than 1,000 and greater than 100 were rounded to the nearest 100; values of 100 or less were rounded to the nearest 10, and therefore totals may not sum due to rounding. In cases where subtotals are provided, the subtotals and the totals are individually rounded. The totals are not a sum of the rounded subtotals; therefore, the subtotals may not sum to the total within the table.

As indicated in Table R2.5-35 and Table R2.5-36 (Appendix R2), BLM's conservation designations could exclude from development about 66% of the 36,000 miles of linear surface water features and 62% of 182,000 acres of areal surface water features on BLM lands in the DRECP area.

IV.5.3.6.3 Impacts of Transmission Outside the DRECP Area

The impacts of transmission outside the DRECP area on flooding, hydrology, and drainage would be the same under all alternatives. These impacts are as described for the No Action Alternative in Section IV.5.3.1.3, Impacts of Transmission Outside the DRECP area in No Action Alternative.

IV.5.3.6.4 Comparison of Alternative 4 With Preferred Alternative

Comparison of Alternative 4 and the Preferred Alternative with respect to potential for BLM DRECP area development impacts to surface water resources follows:

- Alternative 4 could allow development of up to 1.0% of the total mapped 100-year floodplain compared to 1.7% for the Preferred Alternative.

- Alternative 4 could allow development of up to 0.3% of linear surface water features compared to 0.4% for the Preferred Alternative.
- Alternative 4 could allow development of up to 1.4% of areal surface water features compared to 2.3% for the Preferred Alternative.

Comparison of Alternative 4 and the Preferred Alternative with respect to conservation of surface water resources resulting from conservation designations on BLM lands in the DRECP area is summarized as follows:

- Alternative 4 could conserve 65% of the total mapped 100-year floodplain compared to 54% for the Preferred Alternative.
- Alternative 4 could conserve 66% of linear surface water features compared to 70% for the Preferred Alternative.
- Alternative 4 could conserve 62% of areal surface water features compared to 34% for the Preferred Alternative.